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Galaga

Arcade Perfect on COMMODORE 64!

HARDWARE REVIEW APPLE II

ZX MASTER MIND

NanoComputer Z80 - PANDORA'S Box EX - Interview with Bill Mensch - AmigaOS 3.2 - Exclusive Reviews!!!

90 PAGES

The unknown variable called time

If there is one thing today that we have got in great quantities in retrocomputing, it is resources to draw on. The Internet offers us countless opportunities to retrieve documentation, books, magazines, guides and manuals for our beloved computers. It's so easy to find both digital and traditional material. And then there's the vintage hardware. For years, cellars, attics and car garages have been looted and thousands of famous and widespread 80s/90s computer models have emerged. This is all to the advantage of collectors and enthusiasts who bought them at modest prices, then they repaired and tested them and, in some cases, got real in-depth use out of them, perhaps like they used to, back in the day. Putting together a collection of respectable hardware does not take much in terms of money, after all, unless you want to own those few models or peripherals of a certain rarity that have become an expensive investment. Certainly a few years ago the prices of second-hand computers were (much) lower on average. But with a little patience, a little constant research, a little technical knowledge, a little trusted knowledge (for example, subscribing to Facebook groups or forums specialised in certain brands helps a lot), all in all, you can also buy up some fun at good prices. Let's not forget the most important ingredient of all: caution, because fraud by real scammers or speculating sellers is always around the corner. Careful attention should be paid to prices that are too low or bids that are too tempting.

All of us retrocomputing enthusiasts could limit ourselves to emulators. Why not? After all, many of these have reached an astonishing maturity and with the right resources and settings, achieving a look-and-feel very close to the good old physical machines is basically guaranteed. But it's not the same - it's not enough: nothing can replace the thrill of touching the plastic or metal of the cases, typing commands on a real keyboard, even smelling the overheating of the ICs and CRT monitors, hearing the noise of the disk drive while loading the programs, admiring the original colours of the games and so on. Not even the "reproduction" (often absolutely faithful) and the flexibility provided by FPGA boards such as MISTer and MISTICA can compete with the sensations provided by the real machines.

And then, let's face it, the search for old hardware also provides its share of fun. Dealing daily with the prestigious brands of a now defunct market, looking for models and accessories considered unavailable, discovering computers and consoles that survived for only a few years, following the innovations of modern peripherals that can be connected to old machines and making the user experience comfortable and efficient. All this is incredibly exciting and fun.

And all this takes time. So much time spent reading forums, attending groups of users to ask questions and provide answers, downloading and reading books and magazines that are three or four decades old, scouring classified sales sites and much more. Of course, there is also a downside: that sense of frustration for all the time that is needed and will probably always be needed in order to be able to deeply study and make the best use of the computers that we have managed to accumulate. Think about it, any 8-bit computer in itself represents an endless mine of ideas, resources, and possibilities of use both from a software and hardware point of view. One life would not be enough to go into every single aspect of it, let alone dozens of different machines.

Time. The time variable that, even for this small hobby activity of ours, turns out to be the most precious currency available.

David La Monaca

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Apple II

by Leonardo Miliani

After analyzing, in the previous articles, two of the three components of the so-called "1977 triad", that triptych of computers, all released in the same year, then marked the history of computer science and opened the way towards the spread of home and personal computers that we then witnessed in the following decade. So we could not leave out the third member, perhaps even the one that more than others has really marked a path followed by many others. We are obviously talking about the Apple II, designed and built by two great "Steve", namely Steve Wozniak and Steve Jobs.

Back in time

To understand the genesis of the Apple II we must first of all go back in time, to 1975. At the time, Steve Wozniak, an electronics enthusiast, had started attending the meetings of the Homebrew Computer Club, a club of computer enthusiasts that had formed just that year after the Altair 8800 was put on sale. Wozniak had been so caught up in this new adventure that he decided to design and build his own computer. The idea remained for a while a mere project until, in the middle of 1975, MOS Technology released an economic CPU that he, a student without money, could buy: we are talking about the 6502. Thanks to this microprocessor, Wozniak managed to make his computer, which he began to show at club meetings. And this is where the other Steve mentioned earlier comes in: Steve Jobs. Jobs and Wozniak had met a few years earlier and shared some work experiences, including the few months spent in Atari in 1974 where Jobs had helped Wozniak make one of the early versions of the video game Breakout. During these years Jobs had been able to appreciate the incredible genius of Wozniak's manufacturing solutions, capable of producing an electronic circuit using as few integrated circuits as possible (a capacity he had developed in the past since, being always short of money, he had to minimize the integrated ones to buy). Wozniak, for his part, had known the nose for business, the dialectical arts and the great persuasive ability of Jobs, skills that made him a perfect "business man" able to treat business well and anticipate the needs of people. Jobs had helped Wozniak develop the computer and then convinced his friend to produce some cards to sell to the participants in the Homebrew Computer Club meetings. Seeing the good feedback, Jobs realized the potential of the machine and proposed to Wozniak to get together in business to start a larger-scale production and sale. In 1976 they founded a company they called Apple and Jobs made arrangements with one of the first open computer stores in the area, the Byte Shop, to sell 50 cards of what they called the Apple computer (only after the presentation of the Apple II, it will be referred to as "Apple 1"). Once the agreement was concluded, in a month of work they produced the promised cards and the store began to sell them for 666.66 dollars each.

The development

With the first money that went into Apple's coffers, Jobs and Wozniak began to think about how to improve their product. Jobs studied the requests, suggestions, and criticisms of their computer buyers gathered from the Byte Shop while Wozniak thought about what was missing for that computer to run the Atari Breakout game. Jobs understood that people wanted a computer that was even easier to use. The Apple 1 was offered already assembled but it was not yet a ready-to-use computer: the buyer had to add a power supply, a keyboard, a television and,

Fig. 1: An Apple II with the dedicated monitor resting on the case (photo by Rama & Musée Bolo - source Wikimedia Commons)

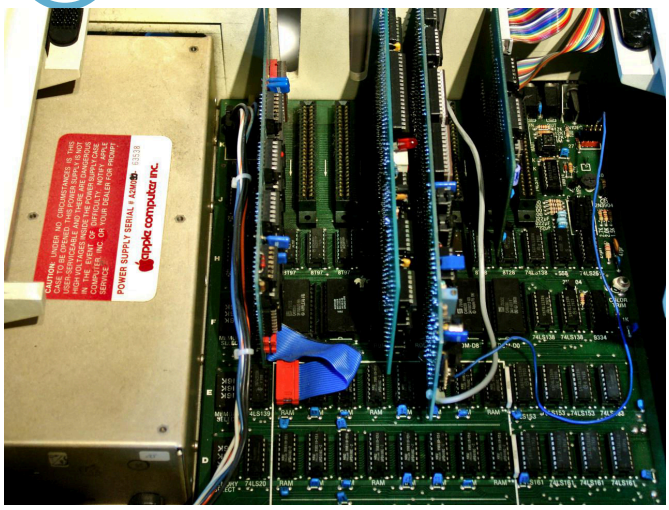


Fig. 2 - Detail of the expansion slots of the Apple II (photo by Erkaha - source Wikimedia Commons)

possibly, an interface to use a cassette recorder. Wozniak, for his part, had identified some points to change: he wanted the computer to be able to run a Breakout clone game, so since the start of his project, he added sound management, a circuitry to connect game-pads and the possibility of creating colour graphics with commands able to draw easily and directly from the BASIC.

Paul Terrell, the owner of the Byte Shop, had on his own made a wooden house to contain the computer, so as to make it more palatable, so that he would lose that nerdy aura of product that had a plain board and make it look more like a real computer terminal. Jobs was enlightened by this idea and decided that even their computer should have an attractive but familiar case, so that even at first glance it leaked the idea that it was a simple object to use, like any other device.

To develop the computer with all these new ideas, the two Steve needed money. Jobs found them thanks to a financier, Mike Markkula, who managed to convince with his dialectical skills to invest in Apple. Markkula poured $250,000 into the company's coffers: thanks to this money Wozniak carried out the hardware development while Jobs thought of the rest. He contacted Jerry Manock, who had previously worked as a calculator designer at HP, to whom he commissioned the construction of the case. Metal (too heavy) and wood (too rough) were discarded, choosing plastic, which allowed to obtain a minimal design characterized by a crossing of curves and edges. Jobs wanted a container that contained all the hardware, including the power supply and the keyboard. Wozniak, on the other hand, had insisted that the computer be expandable and had inserted, at the back of the motherboard, as many as 8 expansion ports for as many cards to be used to add functionality to the machine (figure 2). The problem with these cards was that they were housed vertically, forcing a fairly high house. The container was therefore raised in the back but studied in such a way that it formed a plane on which to place a dedicated monitor. To give the idea of a compact case, however, Manock inserted a series of slits in the back that, in addition to facilitating cooling, slimmed the container, and tilted the front part including the keyboard, obtaining two results with the latter solution: it made the container more streamlined, because the user had in front not the highest part of the machine body but the lowest, and also the inclination of the keyboard made typing easier, as on a typewriter.

Technical Characteristics

The heart of the Apple II is the same as its predecessor, the MOS 6502 that made the fortunes of many other 8-bit computers of the time. Chosen for its cost-effectiveness, Wozniak has nevertheless been able to build a highly respected computer around it, capable of being used both at home and in the business environment.

The Apple II does not have a real graphics chip but is able to handle a video image of 40x24 16-colour characters in text mode or 280x192 4-colour pixels (later brought to 6) in graphic mode. Wozniak exploited a peculiarity of the 6502, namely to access the memory on alternating phases of the clock signal. In this way, access to the video data by the image generation circuit takes place during the clock phase that the CPU uses for internal calculations, thus avoiding interruptions of the video flow that would occur in the event that both the CPU and the video circuit attempt to access the memory simultaneously. The video buffer is also not separated from the main RAM: in other contemporary Apple II systems the VRAM is static (SRAM) and is separated from the system RAM, which is dynamic (DRAM), because the latter type of memory was at the time less expensive than the former. The defect of the DRAM is that it needs a refresh circuit, which continuously accesses it for reading to keep the data stored, otherwise it is lost. On Apple II, on the other hand, the computer

Fig. 3 - VisiCalc, the first spreadsheet, initially developed for Apple II (source Apple2history.org)

memory is all DRAM and the video buffer is distributed in several blocks among all the chips that make up the system RAM. In this way, continuous access to the video data on all the memory chips performs the task of refreshing and eliminates the need for a special circuit. Colour generation is also a small miracle of the image generation circuit designed by Wozniak, who studied the exact timing of the NTSC signal to obtain the coloured pixels on the screen. The computer, however, is equipped with video output only: if you want to connect it to a television you need an adapter, which Apple had put on the market only after the computer was released due to the fact that the TV tuner it had made had problems with electromagnetic interference and it was therefore decided to have it made by a specialized company. To generate the audio signal, the computer uses a small internal speaker, always driven by the CPU.

RAM varies from 4 to 48 KB, depending on configuration. Since the memories were very expensive at the end of the 70s, the model initially put on sale was equipped with only 4 KB but the computer was designed so that the user could expand it autonomously even later, unlike, for example, the other computers of the triad, which were more difficult to expand.

At the operating system level Wozniak expanded the Apple I "monitor", the rudimentary program integrated into the ROM that allowed the user to type the commands to launch the programs. On the Apple II, the monitor has been expanded and is here able to manage a slightly more complex interface, capable of reading and writing to and from memory, disassembling programs in memory, and loading and launching software from the cassette recorder. The computer has also integrated into the computer a BASIC interpreter, also developed by Wozniak, called Integer BASIC, because it can only work with whole numbers. The only whole numbers were certainly not the best for a computer intended also for small companies, and in fact later Microsoft will be involved in the creation of a BASIC capable of handling even floating-point numbers, the AppleSoft BASIC.

The statement

The Apple II was presented at the first West Coast Computer Faire, held on April 16 and 17, 1977 in San Francisco. The event attracts many people and the Apple stand features the new company logo, a bitten apple divided into 6 horizontal coloured bands, reminiscent of the ability to generate colored images of the computer, which stands out in plain sight. But despite the efforts made, the media coverage is not exciting: few magazines dedicate space to Apple II (even the note "Byte" does not mention the company in its report), and those few that do certainly do not do so with enthusiastic tones, thinking of yet another computer meteor. Yet, in the following months Apple received several hundred computer orders, thanks to the fact that the stand was placed immediately at the entrance and a large screen reproduced a colourful kaleidoscope generated by an Apple II, attracting the attention of all those who entered the fair.

Because of the high costs of RAM, Apple II is initially offered for sale at prices ranging from $1,298 for the 4 KB model to $2,638 for the 48 KB model. Compared to the prices of the Commodore pet and the TRS-80 Radio Shack (both marketed at around $600), the Apple II seems to have no future, since the cost of purchase does not include either the monitor or a recorder, which the other 2 systems offer integrated. Despite this, the Apple II can play a super-winning card, which others do not have: expandability. During the time that Wozniak had worked at HP, he had learned that users always asked for features that the original machine did not offer, and that was why he had insisted (almost to the point of clashing with Jobs) to equip the computer with the 8 expansion slots, to allow users to add features not initially foreseen.

Fig. 4 - The Apple IIc Plus (photo by Mitchell Spector - Source Wikimedia Commons)

Apple II gained a further boost from the presentation, in 1978, of the Disk II floppy drive, also developed by Wozniak, which allowed the computer to equip itself with a fast and large storage system with which to compete even in small companies, where the need to store large amounts of data is more felt than in the home environment. Still, the computer is the ideal model for the handsome: Apple, unlike other manufacturers, makes available all the documentation on the machine, so that anyone can take advantage of every single feature hidden in its integrated software or hardware. Thanks also to the available schemes, hardware manufacturers can realize any type of expansion card. Therefore, development languages other than BASIC are brought, such as Pascal or Fortran, various games and software are made, and hardware cards are made to add memory, connect peripherals, use additional graphics or sound chips and more. The computer is so successful in the market that its widespread presence in homes, schools and offices leads to games and programs created exclusively for this computer, thus fuelling a flywheel that sees the affirmation of the computer stimulate the production of software and hardware dedicated to it, which in turn push the sale of the computer.

A striking case is VisiCalc, the first successful spreadsheet to establish itself on the personal computer market (Figure 3). It was initially developed for Apple II because this was the computer of its programmer, Dan Bricklin. Placed on the market in 1979 at a price of less than 100 dollars, it immediately became a popular program, cited by all magazines as one of the most powerful and indispensable productivity software. On the other hand, it really was, since for the first time analysts could replace the handmade calculations with endless rows of cells obtained on immense whiteboards with a small computer screen where they could move with the cursor keys and see the values of the cells automatically updated as soon as a data was changed or entered. Everyone wanted VisiCalc, and since this was only available for Apple II in its first year of sale, everyone wanted an Apple II. VisiCalc was the first "killer app" in history (that is, software so desired that people buy the system it runs on just to have it).

Subsequent versions, derived models and clones

In 1979 the next model, the Apple II Plus, was introduced. Compared to the first model, the II Plus integrates a new boot system so if it finds a disk driver in one of the expansion slots, it automatically tries to start any disk present. Thanks to the decrease in the cost of memories, the standard RAM equipment is increased to 48 KB. It also replaces the integrated Integer BASIC in ROM with the new AppleSoft BASIC.

At the beginning of 1983 this model was replaced by the Apple IIe, certainly the most successful and also the longest-running version: it remained on sale until the end of the computer's commercialization, that is 1993. Compared to the previous one, it integrates the Language Card as standard, equipped with 16 KB of additional RAM, so the basic model is proposed with 64 KB of RAM as standard. Thanks to a couple of additional expansion cards (the 1KB-80 Column Card and the 64KB-80 Column Card) the Apple IIe can display 80 columns on a dedicated monitor, a "must" for the new office software that is spreading in that period. In 1985 this model was replaced by the enhanced IIe, which has some modifications to make it more compatible with the Apple IIc, such as the WDC65C02 CPU instead of the MOS 6502. In 1987 comes the Platinum IIe, a version with a case that takes up the new stylistic lines of Apple, which offers an additional numeric keypad and integrates the 64 KB 80-Column Card, graphics card to manage the 80 columns on screen and also adds 64 KB of RAM, bringing the standard memory equipment to 128 KB.

In 1984, the Apple IIc (Figure 4) was introduced, a compact and portable version of the computer, equipped with the WDC65C02 CPU with a 1.4 MHz capacity against

the frequency of 1 MHz of the other models, a 5.25” floppy drive integrated into the machine body, 128 KB of memory and the ability to display 80 columns. This model is replaced the following year by the IIc Plus, equipped with a 3.5” floppy drive and integrated power supply.

In 1986, the Apple IIgs was introduced, a completely different computer, based on the WDC65C816, a 16-bit version of the WDC65C02 (but also capable of emulating the 8-bit 6502). This computer remains on the market until 1992 and represents Apple's response to the Commodore Amiga and the Atari ST but, despite the interesting graphic and audio characteristics that distinguish it, it will not be able to enter the market of 16-bit home computers due to the overwhelming power of the others on the aforementioned systems.

The spread of Apple II inevitably also led to the problem of clones. During its long life, the Apple II has been copied to every part of the world and by many companies, to the point that it is estimated that about 200 computer clones have been produced, of which only 2 officially authorized by Apple, the ITT 2020 and the black model produced by Bell & Howell. Many of the clones copied every aspect of the machine, changing only the label with the logo of the machine (but often also copying that) and replacing it with names of fruits such as "Lemon" or "Pineapple".

The first virus

A curiosity related to Apple is the authorship of the first computer virus, the Elk Cloner (figure 5). Developed in 1982 by a then-sixteen-year-old Richard Skrenta, it hit

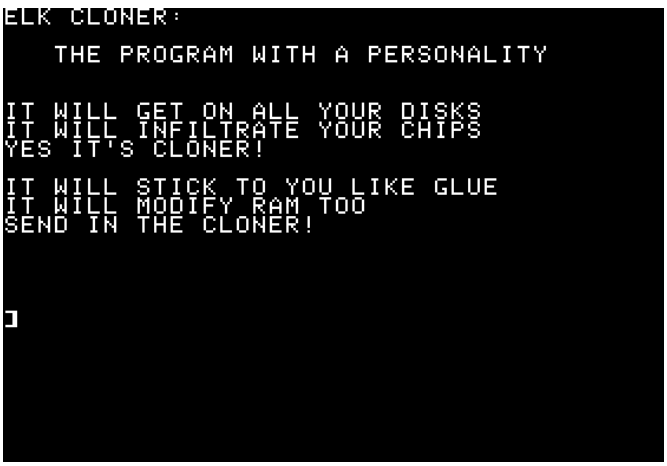

ELK CLONER:
THE PROGRAM WITH A PERSONALITY
IT WILL GET ON ALL YOUR DISKS
IT WILL INFILTRATE YOUR CHIPS
YES IT'S CLONER!
IT WILL STICK TO YOU LIKE GLUE
IT WILL MODIFY RAM TOO
SEND IN THE CLONER!

Fig. 5 - Elk Cloner, the first computer virus in history (Photo by Richard Skrenta - source Wikimedia Commons)

the Apple II with the Apple dos operating system and spread by copying from the boot sector of an infected disk to the computer's memory during the loading of the operating system. He then remained resident in memory and copied himself to each disk inserted in the player whose list of files was asked for. The motivation behind the creation of the virus is quite sympathetic. Skrenta, at the time, exchanged pirate copies of his favourite games with his friends but also inserted software that distributed small "computer jokes", programs that made appear written on the screen during the games. His friends eventually got tired of it and didn't want to trade games with him anymore so Skrenta devised the virus so he could distribute his jokes even without his friends' knowledge. He then wrote Elk Cloner and inserted it into the school computer, making it spread in a silent way. Only after several starts, in fact, the virus manifested itself, blocking the system and causing a message to appear on the screen. The era of bootable viruses was born.

Conclusions

The Apple II, despite its relative simplicity, has become an iconic computer, perhaps one of those that have most marked the history of computer science. In the early 1980s, it saw the birth of a lot of exclusive programs. In addition to the aforementioned VisiCalc, many games were born or established on the Apple II: we can mention the adventure "The Oregon Trail", which benefited from the color graphics of the Apple II, or the platform game "Lode Runner", born on an Apple II Plus. The computer was sold in more than 5 million copies and 50,000 copies a month were sold at its best. It is also the computer that made Apple's fortunes: suffice it to say that in 1982 the company was the first computer manufacturer to reach the goal of a billion dollars in annual turnover. And it was also the computer that on more than one occasion saved Apple from bankruptcy, producing gains while Apple III and Apple Lisa were failing in the market.

Presented in 1977, it remained on sale until 1993, making it the oldest computer of all time, more than 15 years. I mean, an old clam that deserves all our esteem.

Nintendo Entertainment System - (un)protected

by Dr. Andrea Q. - www.retrofixer.it

Youtube channel: https://www.youtube.com/channel/UCEw0CQ8LKyA9jVvWXkEwp4Q

If since childhood one of your favorite recreations was to open the toys to see how they were made inside, then this column might be interesting for you!

The author is a graduate in Medicine and Surgery but has always cultivated a passion for electronics and modifying things.
I still remember when, armed with a hacksaw, I filed the corners of the slot for the Mega Drive cartridges to be able to also insert the japanese cartridges and shortly after I literally destroyed the now abandoned Master System to try to understand the reaos for the the side comb connector...

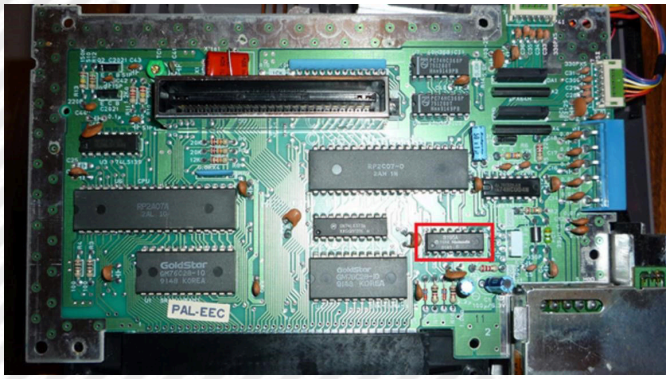
My curiosity for these things has never passed and over time it has become a passion to learn the functionality of the protection systems implemented in the consoles released on the market while I was still a kid, especially those that I had never been able to have.

These systems, hardware and/or software, have been developed starting from simple implementations up to complex algorithms managed by dedicated hardware and processed by as many devices.

The NES

Let's start with the first console produced by Nintendo, the Nintendo Entertainment System, (code HVC-001 where the letters stand for Home Video Computer).

Its protection takes the name of CIC and represents a chip whose acronym means Checking Integrated Circuit;



here it is highlighted in red:
It represents a primitive form of cartridge protection for consoles. The purpose for which it was produced concerned the possibility for Nintendo to globally control the games released for its platform, effectively avoiding the usage of "pirate" cartridges and also being able to exclude the execution of games from different regions.

NES was produced in 1983 but the CIC was introduced by Nintendo to protect its intellectual property when the company decided to launch the console in foreign markets in 1985. Probably the decision is linked to the experience Atari had with its 2600 VCS which had a drop in sales due to the development of poor quality games by third parties. This protection system is therefore not found in Japanese consoles/cartridges and not even in the NES 2 or "top-loading model" (NES-101), produced between 1993 and 1995.

The chip represents a ROM, so it is not possible to rewrite it, and is located inside the console, which acts as a "lock", combined with a corresponding chip, which acts as a "key", present in the NES cartridges other than the Japanese ones:

This chip, produced by Sharp, can be identified with the following codes written on its envelope: 3193 - 3193A - 3195 -3195A - 3196 - 3196A - 3197 - 3197A - 6113 - 6113A - 6113B1 with the following characteristics (unofficial but discovered by those who have studied it over the years):
3193 - USA/Canada
6113 - similar to previous but slightly smaller layout with some differences in initialization
3194 - unknown, perhaps Korean
3195 - pal B (France, Spain, Germany, Sweden, etc...)

3196 - Asia / HK
3197 - PAL A (Great Britain, Italy and Australia)
3198 - Famicombox lockout chip (found in both cartridges and "Box")
3199 - Famicombox coin timer (found only in "Box")
with different content depending on the region in which the console and games would be sold.

HOW IT WORKS

Until 2010, no one had been able to publicly document its functions until Segher, a member of the then-known Team Twiizers (currently known as team fail0verflow), personally documented its characteristics.

As we have already said, the system consists of 2 parts:
- a Sharp SM590 4 bit microcontroller (in the console) that controls the inserted cartridge and acts as a "lock"
- a corresponding chip in the cartridge capable of sending the chip in the console a code that acts as a "key"; if the key is not valid, the system resets.

The chip pinout is as follows:

```
                  ----_----
 Data Out 01 <-x|P0.0  Vcc|--- 16 +5V
 Data In  02 x->|P0.1 P2.2|x-x 15 Gnd
 Seed     03 x->|P0.2 P2.1|x-x 14 Gnd
 Lock/Key 04 x->|P0.3 P2.0|x-x 13 Gnd
 N/C      05 x- |Xout P1.3|<-x 12 Gnd/Reset speed B
 Clk in   06  ->|Xin  P1.2|<-x 11 Gnd/Reset speed A
 Reset    07  ->|Rset P1.1|x-> 10 Slave CIC reset
 Gnd      08 ---|Gnd  P1.0|x-> 09 /Host reset
                  ---------

P0.x = I/O port 0
P1.x = I/O port 1
P2.x = I/O port 2
Xin  = Clock Input
Xout = Clock Output
Rset = Reset
Vcc  = Input voltage
Gnd  = Ground
->|  = input
<-|  = output
-x|  = unused as input
x-|  = unused as output
---  = Neither input or output
```

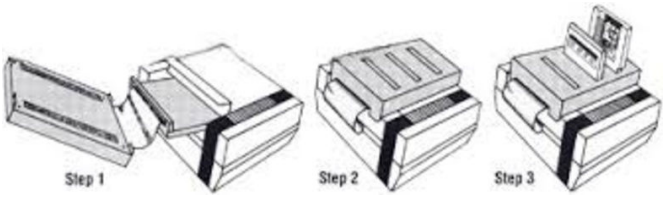
The software that runs in the chip is called 10NES (so the CIC represents the hardware while the 10NES represents the software that runs in the CIC).

The PIN-lock is PIN4; PIN3 represents a "seed" and is connected to a capacitor which does not always use the same to discharge; the CIC records this time and uses it as a pseudo-random generator to decide which of the 16 possible "streams" to use and communicates it to the key chip in the cartridge.

The PIN10 of the chip lock (in the console) is connected to PIN7 of the chip key (in the cartridge) and is able to reset the console.
PINs 11 and 12 (RESET_SPEED) are used to decide at what speed to "blink" the reset line (about 0.4s, 0.6s, 0.8s, 1.0s each on/off) and then restart the console.

HOW TO BYPASS IT

Over time, several systems have followed to have reason for this protection:
1) Many third-party developers chose to send a rapid electrical pulse (called a voltage spike) to temporarily knock it out and allow the non-Nintendo-licensed program to run. Nintendo reacted against this "technique" producing a hardware revision of the NES immune to the specific "attack" (in particular those with the writing "NES-CPU-11" on the PCB)
CURIOSITY: apparently older revisions (labeled as "NES-CPU-04" on the PCB) were instead substantially unable to support the protection so, if you have to buy a second-handNES, try to know the hardware revision and look for an "old" one.
2) some developers (such as HES) instead developed a "dongle" capable of connecting to an authentic cartridge to bypass the control through it:



3) A company affiliated to Atari, called Tengen, managed to obtain the patent "abusively" from the United States Patent and Trademark claiming to have it to defend itself in a lawsuit; this patent was used to produce a clone chip that was called Rabbit (to know all about the legal tussle, you can read this interesting paper: http://www.patentarcade.com/2005/08/case-atari-v-nintendo-nd-cal-1993-cp.html).
4) A small company called RetroZone produced, after the expiration of the 10NES patent (ended on January 24, 2006) its own chip based on the reverse engineering of the previous Rabbit and called it CIClone:

Kevtris' CIClone Lockout chip pinout

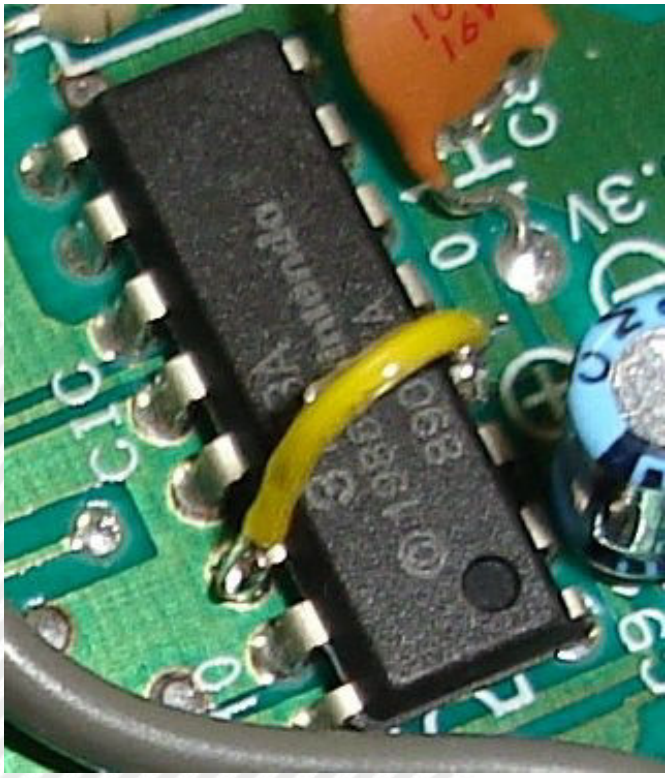
```
                    ,---_---.
            +5V 1 ---|01   08|-- 8 GND
            CLK 2 x->|02   07|<-x /Force NTSC
Lockout functioning 3 <-x|03   06|x-> Data Out
          Data In 4 x->|04   05|<-x Reset
                    `-------'
```

5) The chip was subsequently emulated in microcontrollers such as the ATtiny13A (in the photo the pins of the microcontroller to be connected to the respective pins on the NES cartridge):

```
                ATtiny13A
                ,---_---.
          nc -x |1     8| --- VCC
(NES-71) clk x->|2     7| <-x rst (NES-70)
         led <-x|3     6| <-x din (NES-34)
         GND ---|4     5| x-> dout(NES-35)
                `-------'
```

6) Since in some cases the protection system could not authenticate even the official cartridges (for example if the cartridge contacts were not properly clean), a hardmod to disable it is to lift or cut the PIN4 of the CIC:

or connect the chip PIN4 to the ground (in the photo PIN14); in this way the chip works automatically both as a lock and a key:

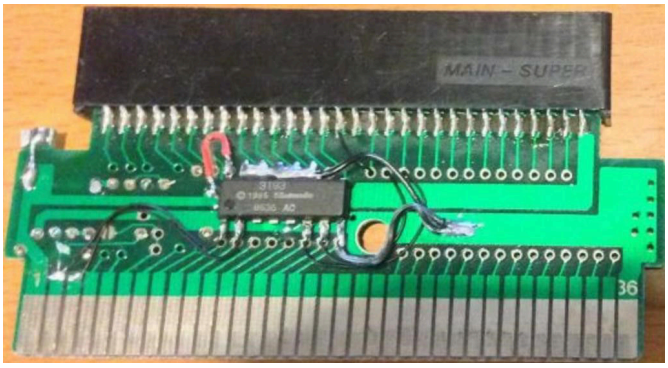


PHYSICAL PROTECTION: PINS

To avoid using Japanese cartridges in consoles in other regions and vice versa, the Japanese console (Famicom) had smaller cartridges at 60 PINs while those in other countries had 72 PINs:

Consequently, it was not physically possible to exchange them between consuls from different regions.

Obviously, adapters for both situations were created in a short time to overcome this regional "blockage", including bypassing the CIC via integrated CIClone-style or an original Sharp chip taken from an original cartridge:



We are therefore at the dawn of protection technologies but we have seen how ingenuity was not lacking both from producers and from those who did not want to have "restrictions" ! ^_^

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Pandora's Box EX, an EXtraordinary EXperience

by Roberto Lari

In this article we are going to talk about a type of products on the market for several years now. With the latest model just released on the market, the EX "Home" version put on sale by LeonArcade, has undergone a considerable upgrade both in hardware and software (compared to the previous DX Home version), becoming to all intents and purposes, a great product. A nice machine to buy, connect to a screen together with one or two USB joysticks / gamepads, Just turn on and be ready to use it immediately or as they say in these cases "out of the box", but let's proceed step by step.

Two years ago I bought the DX version from the same manufacturer (Home again) and a couple of months ago they contacted me to thoroughly test their latest product, the Pandora's Box EX Home. just from the description of its hardware characteristics, it was definitely very interesting.

For those who are not aware of the Pandora's Box, these are mini computers of about 19 cm x 12 cm by 2 cm in height, originally designed to run an emulator, the Final Burn Alpha, with already installed on board hundreds of arcade games and Neogeo (those that were found years ago in the games room coin-ops).
Several official releases of the same manufacturer (3A-Game Electronic Technology, located in China) have begun

LEON

	Pandora DX	Pandora 3D	Pandora EX
CPU(ARM)	4-core A7 1.5GHz	4-core A9 2.0GHz	4-core A53 2.0GHz
GPU	Mali-450 Mp2	Mali-450 Mp8	Mali-G31 Mp2
RAM	2Gb DDR3 1866Mhz	4Gb DDR3 1866Mhz	8Gb DDR4 2666Mhz
Games	3000(34*3D)	8000(250*3D)	3300(58*3D)
SD Card	32GB	64GB	64GB
Remaining space	900MB	1GB	7GB
HDMI resolution	1280*720	1280*720	1920*1080 1280*720
VGA resolution	1280*720 640*480	1280*720	1280*720
Sound card	5.1	5.1	7.1
ADD Games	U Disk	U Disk and WIFI	U Disk

Fig. 1: HW Comparison between EX, DX, and 3D

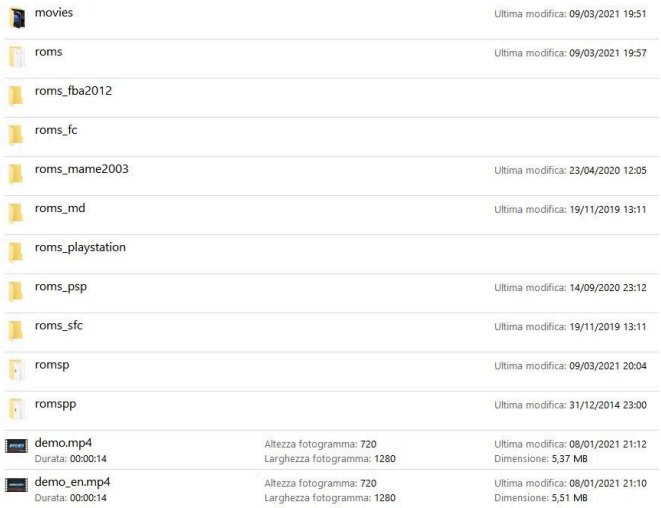

Fig. 2: Folder structure of the SD supplied with the EX

to be available over time, and in parallel, several alternative versions (clones?) have also been developed by other manufacturers, in both cases over time they have increased the number of games pre-installed and updated the hardware of the consoles themselves.

To date, however, there are perhaps too many versions, created by different manufacturers and this can lead to confusion, especially for those who would like to get closer to this type of product for the first time, so I will try to make a little clarity to help you better understand this world and untangle yourself in this jungle.

First of all, you should know that Pandora's Boxes are divided into two types, which differ from each other by the type of physical connection of the audio/video outputs, the controllers and the power supply.
The first type called "Jamma", was born with a Jamma connector and was created to be inserted into a game room cabinet, which through this single connector, originally allowed to connect to the PCB arcade board of the single video game: the video (typically a 15 or 25 Khz CRT TV), the power supply, the speakers and the joysticks with all the related buttons including "coin" and "start". In this way, the Pandora console replaces the physical card where the single video game was present, however, making available a large number of items (destined to grow more and more over time), selectable when turned on through a menu and using the joysticks themselves

Time: 99
Page: 4 / 6
0031 Mario Kart
0032 Need for Speed – Most Wanted
0033 Initial D – Street Stage
0034 Cars
0035 Need for Speed – U R
0036 Burnout Legends
0037 SEGA Rally
0038 Virtua Tennis – World Tour
0039 FIFA Street 2
0040 Smash Court Tennis 3
PANDORA BOX EX
Free Play

Fig. 3 - Some 3D titles featured

to scroll up and down, to do searches by type or by title, or you can select one of our favorites.

The other family of models is the one called "Home", which is the one we will talk about in detail in this article, and differs by the fact that it does not have the Jamma connector, but is equipped instead with an HDMI output and a VGA, allowing with the first to connect a modern TV or HDMI monitor while with the second allows us to connect a CRT VGA screen or a VGA 31 Khz LCD (in this case it is also necessary to connect speakers, headphones or a hifi system for audio).

In the Home version, you can also opt for two solutions, the first is to buy the console without a dashboard (but with its power supply to be added to the shopping cart, which otherwise would not be supplied unless you already have a 12V with round connector and 2/3 Ampere), connect it to a video compatible HDMI or VGA, and connect one or two USB arcade joysticks (I recommend those that mount a zero delay encoder inside them) with six or better eight focus buttons, alternatively you can connect one or two gamepads via USB (as you typically do with current modern consoles) between the compatible ones.
The second involves the purchase of the Pandora directly inside a dashboard equipped with one or two arcade joysticks connected directly to the 40-pin comb connector on the Pandora.

Personally, I prefer something very small (so without the dashboard) connected near the screen, with the arcade joysticks connected via USB and in addition to considering this setup less cumbersome (the planks are just over 60 cm wide by just over 20 cm deep), when you happen to switch to a new model, it's all easier; you disconnect the few connections, replace it and reconnect the cables, and it's done. Moreover, if you buy the ones with the dashboard, there may be a limitation on the models for sale.
Nothing excludes that you can create the bridge itself with its joysticks inside and connect us to a Pandora purchased separately.

Even after deciding on which version to go to (Jamma or Home, and in the case of Home, wit the dashboard or not), there is still another problem to solve, who to contact? Personally my experience is this, there are suppliers on both Amazon and AliExpress, each with pros and cons.
On Amazon they can be very fast in shipping but they do not provide the games supplied and you have to follow a series of complex instructions to be able to download and insert them into the console, with some waste of time. It is not a ready-to-use solution out of the box, there are several models but they are not up to date (the current model just released, the EX, is not present at the time of writing this paper), moreover they are almost all only models with the dashboard and prices are on average higher.

On AliExpress there is a wider choice of models and suppliers, on the price it is necessary to take into account custom duties, as they are carrying out more and more checks, for the products we buy from China, in fact, in the meantime that I was writing this article, I gotta pay that for the EX, for an amount of about 16 euros (I also got it for the DX at the time), but the games are already present.
Attention that now things are changing, in fact LeonArcade has set up a warehouse in Spain from where you can buy their products and this results into two great advantages: no customs and shipping times and much faster delivery (in the order of one week at most).

Let's start by analyzing the software and hardware differences between the previous DX and the new EX offered for sale by LeonArcade.
The two products are aesthetically identical : a rectangular plastic body equipped with various connectors and available in various colors.
On the back we find: two USB ports (instead of three as

Fig. 4 - Some titles for 3 and 4 players

Fig. 5 - Available filters for searching games

in the previous model), the "Settings" button (used to open the settings menu, we will analyze it later in detail), the volume potentiometer, the 3.5"jack for external audio, the VGA connector, the HDMI connector and the female connector for the power supply.
On the top there are pins on which it is possible to connect an ON/OFF switch (not standard) and the 40-pin connector for connecting the arcade joysticks if the console is mounted inside a bridge.

We analyze the differences between the DX version and the EX version (we always talk about Home), as many people own , including me, the DX and wonder how and how the EX version, his worthy heir to the throne, can change.

At the hardware level, it goes from a 1.5ghz 4-core A7 CPU with a Mali 450 MP2 GPU, 2GB of 1866mhz DDR3 RAM to a 2ghz 4-core A53 CPU, Mali-G31 MP2 GPU and as many as 8GB of 2666mhz DDR4 RAM, a truly remarkable leap in power combined with a total software revision, now based on Android.

This results into two big advantages, the first is clearly a greater power and more than enough now to run the games in 3D, you see a lot in games already present on the DX that were running very slow and raucous as Army Men, where instead is very fluid on the EX or in new titles like the 2 Need for Speed. The second advantage that I personally consider even more important is that many classic issues turn out much better than the DX. Especially, I noticed it on horizontal scrolling issues such as Flicky, R-Type, Section Z where tearing, present on this type of console, makes it particularly annoying to play with, a defect that I have always considered their Achilles heel, practically absent on the EX, although I believe that this improvement is more due to an optimization on the software used.
(For those who do not know the tearing is the lack of synchronization of the frames, which causes the overlap of a part of a frame with a part of the next, on the DX this defect is so obvious and annoying to pass the desire to play games like Flicky).

In Outrun instead, where at the start of the race the game and the audio were very slow and the same thing also manifested itself on the second level, when passing under the stone bridges, with the EX thanks to the improvements applied on both fronts HW & SW, all this no longer exists, making this console really remarkable and pleasant to use. I underline all this "out of the box", that is you plug and play, without worries, which I think is one of the most important reasons why it is worth having and using this kind of product.

Although it can be easily connected to modern LCD screens, the ideal would be to use it on a CRT (maybe not more than 21/25"), because as you well know, these video games were designed at the time to be used on cathode-ray tube screens with certain characteristics and really in my opinion lose a lot when used on other types of videos such as flat screens, especially with the 16:9 that enlarge the image by distorting and distorting it. A middle way might be to use a 4:3 VGA LCD that while not a CRT, at least does not deform the image. Despite this, I still wanted to put myself in the shoes of the casual gamer, that is, of those who want to buy it and connect directly to the typical HDMI 16:9 TV from 40 or more inches of the living room, connect a couple of USB joysticks (or gamepads), turn it on and immerse yourself again in the atmosphere of the 80s and 90s game rooms, trying some games with another player and the result was a fun so high that I even forgot that I was using a 46" LCD screen. Also after 4 hours of uninterrupted play, the console did not show the slightest sign of failure, let alone the games showed slowdowns of any kind, and I could also see that on some titles such as the 2 NFS already mentioned, the memory cards of the original consoles where the game had been conceived are also simulated,

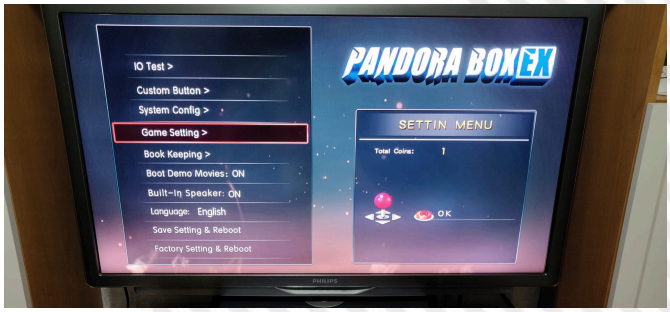

Fig. 6 - Settings home page

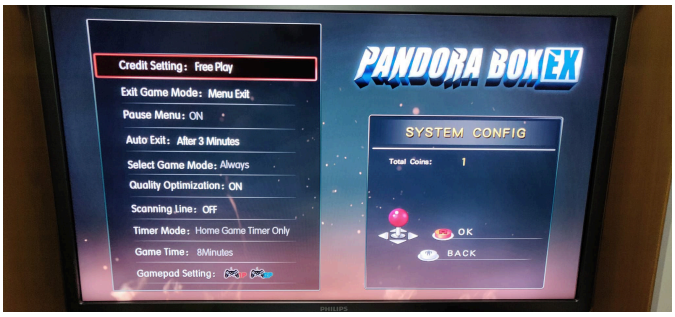

Fig. 7 - Settings sub-page

really a great thing.

A valid alternative to obtain a still quite satisfactory result on a 15Khz CRT TV would be to connect the Pandora via a VGA to composite and Svideo adapter (I attach the link below), with a modest expense of about 14 euros on Amazon, you can use any CRT TV and not necessarily a VGA CRT monitor or a CRT TV with RGB input (not all TVs are equipped with it, while the video input is present on any TV). If your TV were equipped with Svideo input (a video quality halfway between RGB and composite), then the video quality could improve a little bit more. This adapter, unlike those from HDMI to composite, allows you to adjust the size and position of the screen, to be able to center the image perfectly on any TV you will be using. For audio, in this case, you will need to connect a 3.5" male jack cable (typical of standard headphones) to the 3.5" female jack on the Pandora but that has the usual two white and red Cinch RCA cables at the opposite end, which will accompany the yellow Cinch RCA cable used to connect the video output from the VGA adapter to the TV. If the TV will only be equipped with a Scart socket, just add a three female Cinch RCA yellow-white-red adapter to the male Scart, there are all the links at the bottom of the paper of the various adapters and cables mentioned.

Wanting to find defects it is true that over time the number of games preinstalled has grown really much, but those to be considered as really present is in my opinion lower, because there are really many variants of the same issues (eg KoF 97, KoF 98, KoF 99, KoF 2001 & KoF 2002).

In some cases, the same games are present both in the traditional version and with hacks or small modifications to the game to make it easier, such as Area 88 or Gradius 3, present both in the original version and in the one where you are invincible. There are also several console games such as NES, MD, SNES, in some cases titles already present in the original arcade version.

A number of these doubles is also the same game as in the three-or-four player version; you can reach this number if you connect the two dashboard joysticks via the 40-pin connector together as well as one or two joysticks / gamepads via USB. Another flaw is that the games are not displayed in alphabetical order, so to quickly find a game, it is advisable to do a direct search by title or alternatively create a list of favorites, where we will put the games that we will use more often.

Also note the presence of special titles such as Lemmings 1 and 2 or Operation Wolf that without a mouse or gun, are not really the best to play, having to settle only for the joystick. This gives me a lot of the idea of just wanting to artificially grow the number of issues present.

On the other hand, the presence of new 3D titles, such as the two versions of Need For Speed of the PSP, not present on the previous models, for a total of almost 60 3D titles, is noteworthy.

Another positive note is that the games set as favorites always appear first (so much so that in the end good or bad, you play practically always the same games :D), below are then the 330 pages of all 3300 games present. Unfortunately, some very interesting titles are missing such as Splatter House 1 or Chuck Rock 1, but what is particularly curious, there are their sequels, also Aladdin is only present in the version for Nintendo 8 bit, I would have preferred those for the Super Nintendo or MegaDrive

Fig. 8 - How the Pandora's Box EX console looks like

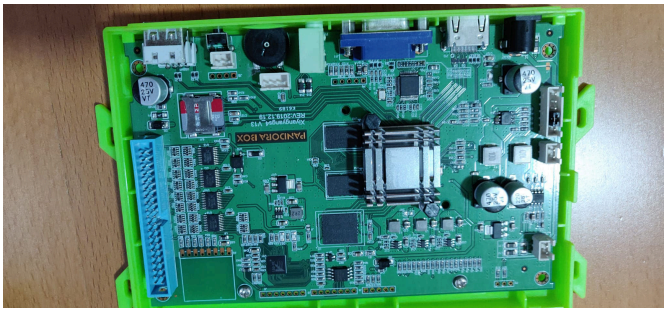

Fig. 9 - Its complete motherboard inside

Fig. 10 - How it looks like on a 4:3 LCD

but do you want to do... you can not have everything from life :D

To add more, it should be possible (by reading the specifications) to do so through a USB stick, following the instructions found on a video on YouTube, which I publish the link to at the end of the paper.

Consider that even if it were possible to add them directly to the MicroSD, the problem remains that for the first two years it is not possible to open the console, otherwise the warranty will be lost.

You will find the link with the video showing the full list of games available on this console at the bottom of the article.

Among the functions already present on the previous model and maintained here, we have the possibility to save the game in progress to be able to resume it later, always only one slot per game (but only with the "free coin" mode!). Also for some titles, there is the option to activate the Autofire, simply by holding down the focus key. Option that I personally recommend in titles like R-Type to avoid finger cramps, although this makes the gaming experience a little less equal to when playing on coin-ops in the arcade, where Autofire was not expected. On the EX there is an interesting novelty to save the records, an option not present on the DX and this is a great improvement for me.

In the Settings menu there is a good number of options, among which we have the possibility to vary for each individual game the number of lives and the difficulty of the game itself. It is also possible to enable a filter to improve the graphic performance and one to activate a sort of scanline, to be used on LCD screens to simulate a little bit the performance of a CRT.

It also allows us to customize the controls of the two joysticks, being able to change the assignment and the correspondences of the various focus buttons.

Pay attention to the option that allows you to select between "free coin" and simulated tokens, because if you put free coin you can safely use the usb arcade joysticks, while if you put one of the modes with the simulated tokens (for example 1:1, one token for each time you

press the "coin" button), only the joysticks inside the boards will work (because they have a particular type of connection between these and the console). Luckily if you are wrong, you can always go back to this menu to correct the choice.
I would close with a little clarification on the abbreviations that I have very often noticed creating confusion:

CRT = Cathode Ray Tube, is the acronym that identifies the cathode-ray tube of the old computer and TV monitors, previous to the (flat screen) models released later and equipped with LCD panels

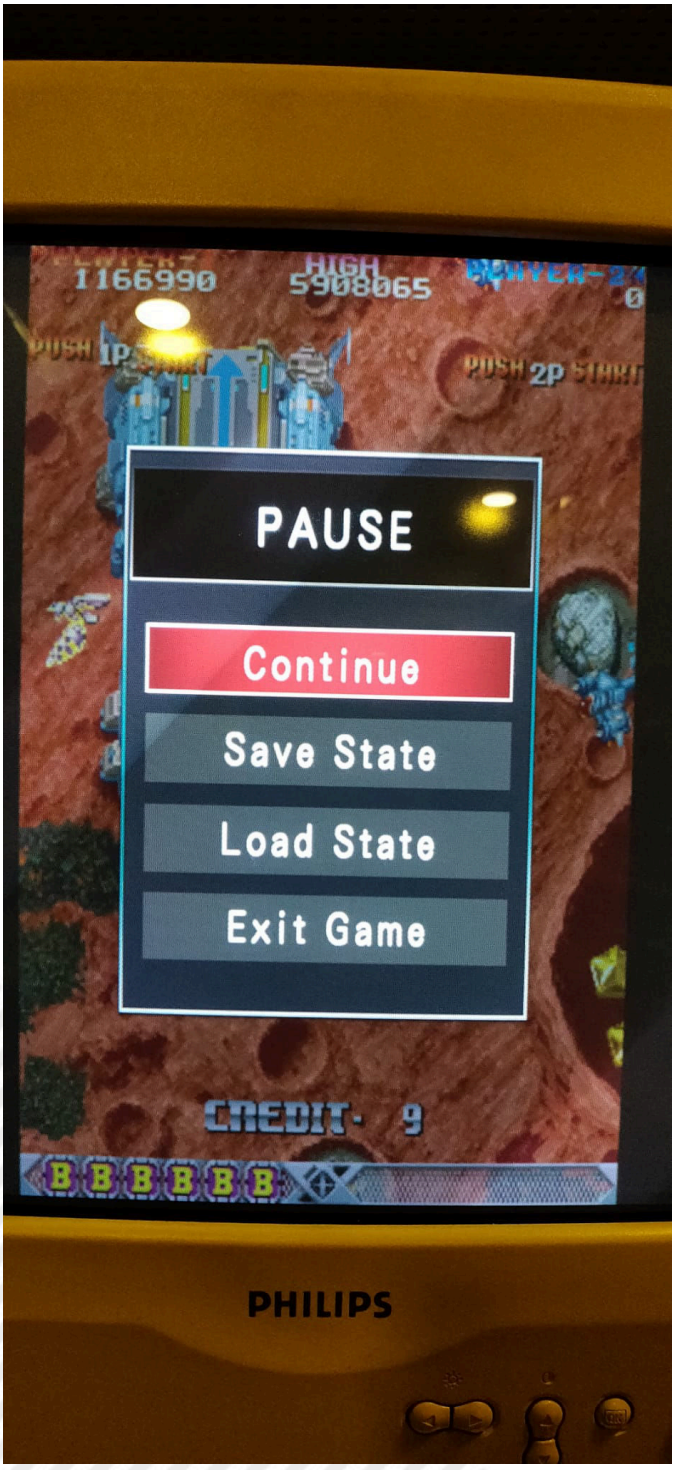

Fig. 11 - Pause function activated and possibility to save/load the game

LCD = Liquid Crystal Display, it is the acronym that identifies any modern flat screen regardless of the connectors it has and the signals it is able to receive

15 Khz = typical working frequency of screens accepting an RGB, Svideo or composite signal

31 Khz = typical working frequency of screens accepting a VGA signal

VGA = Video Graphic Array, is the acronym that identifies a type of signal transmitted and works at 31 Khz

RGB = Red, Green, Blue, is the acronym that identifies a type of signal transmitted and works at 15 Khz and on CRT screens is the highest quality video signal available

S-Video = signal transported through two separate wires, one for luminance and the other for chrominance, in practice the first carries the signal for brightness and the second for colours.
It is halfway between the RGB signal and the video composite as video quality

Composite = signal that on a single wire carries and mixes all the signals, resulting in lower quality than RGB & S-Video

HDMI = High Definition Media Interface, is the connection between devices that has become standard on modern LCD screens and has replaced the Scart

SCART = is the standard connection between devices present on most CRT screens (except a few rare exceptions on older models), it is able to carry different types of signal: RGB, composite and Svideo, it has been present as an equipment for a long time also on LCD screens, but it becomes increasingly difficult to find it on the TVs of more recent manufacture.

When using these acronyms, you should be as accurate and correct as possible because if you were to just say CRT for example, you wouldn't be specifying a particular screen model that could be both a 15khz TV and a 31khz VGA (PC monitor), but you're just saying that you're talking about a screen equipped with a cathode-ray tube.

Fig. 12 - USB arcade joystick with zero delay controller used to test the console

There are also special combinations such as LCD TVs equipped with different inputs including the SCART and the VGA, which can therefore receive and process both 15 khz and 31 khz.

For those who want to buy the Pandora's Box EX by LeonArcade in Home version with the games pre-installed (remember that the power supply is to be added if you are not already provided), as always the link is shown at the bottom of the article, also available for smartphones is the AliExpress app to be installed.

For the Jamma version, be patient and wait until November that will really be worth it!
(It could also be that by the time you are reading this article, it will have already been listed)

I hope I have helped you to clarify the ideas about this wonderful world and if you need, you can subscribe and ask for any kind of information about the Italian group dedicated to Pandora's Box, which you can find the link on the last page.

Greetings and to the next paper!

Useful links:

Video on how to add games to Pandora's Box EX
https://bit.ly/EX_USB_games_added

VGA to Videocomposite & Svideo adapter
https://amzn.to/3EufFiL

Audio cable from 3.5" Jack to two RCA Cinch
https://amzn.to/3BpxrSk

3 Cinch RCA female to Scart male adapter
https://amzn.to/3nMBV0q

List with all the games inside this Pandora's Box EX by LeonArcade
https://bit.ly/EX_games_list

Italian group dedicated exclusively to Pandora's Box (all models and genres)
https://bit.ly/Facebook_Pandora_Italia

Direct link to purchase Pandora's Box EX by LeonArcade
https://bit.ly/Pandora_EX_LeonArcade

The NanoComputer Z80 Learning System

by Alberto Apostolo

When I was a student in the 1980s, my school (I.T.I.S. of Foligno, now I.T.T. Leonardo Da Vinci) had a SGS NanoComputer Training System (Fig. 1). You could write and test short programs in machine code for the Zilog Z80 microprocessor.

After receiving some old IT magazines as a gift from one of my father's colleagues, I made a terrible discovery: I realized that at the time me and my schoolmates had only exploited a very small part of the possibilities offered by that machine.

To remedy that in some way, I wrote this paper and collected some interesting links to share with those who own the NanoComputer and still want to use it to make some small projects.

The Laura Tellini Calculator Museum in Prato (Italy) also has a NanoComputer in good condition and I hope that the information provided in this paper will be useful to the curators.

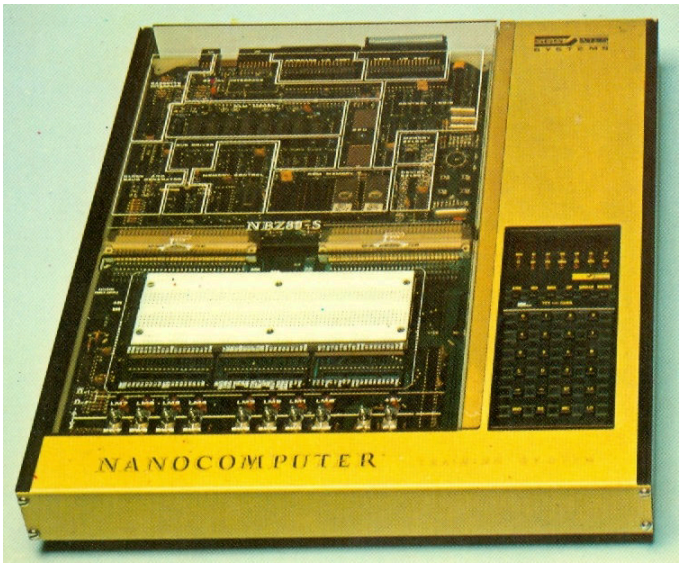

Fig. 1

Training System produced by SGS-ATES in Agrate Brianza (Italy).

Brief history of SGS-ATES

Before the outbreak of home-computers, in the period 1975-1980 appeared microprocessor systems to carry out small experiments in electronics and programming in machine language [MCT20]. Among the educational systems on the market, there was the NanoComputer

SGS (Società Generale Semiconduttori = Semiconductor General Society) was a company founded in 1957 by Olivetti with Telettra and had to be able to produce electronic components (transistors and diodes) that were then produced only abroad. Until 1968, the production of electronic components was licensed by the US company

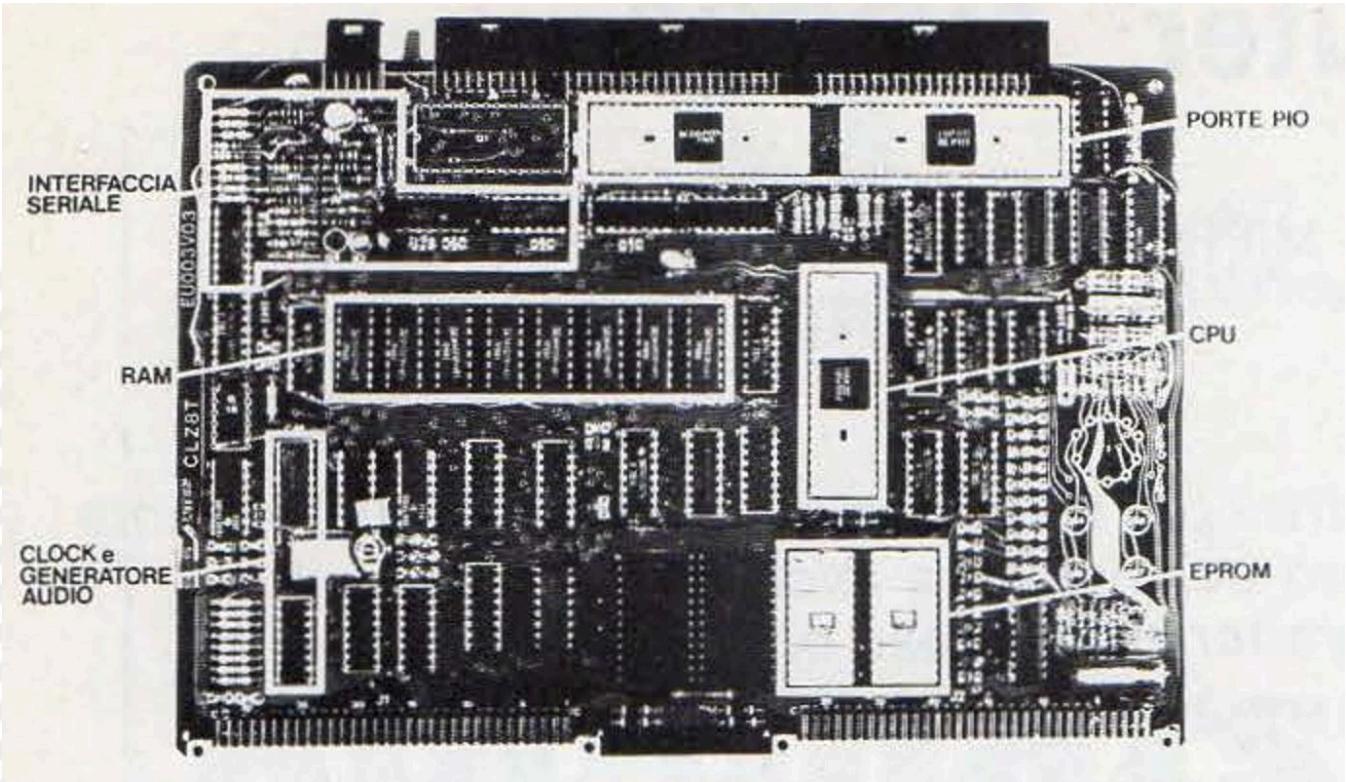

Fig.2

Fairchild. In 1972 it was merged with the Italian ATES (Aziende Tecniche Elettroniche del Sud = Southern Electronic Technical Factories) and then after other mergers it became the current STMicroelectronics, a multinational among the most important companies in the world.

The NanoComputer

This interesting product entirely Made in Italy was born thanks to the innovative idea of a valid director of SGS-ATES: Eng. Mario Scavino. With the collaboration of an equally valuable group of technicians, from 1979 the NanoComputer was produced and marketed [NCP20].

The NanoComputer was a single-plate system intended for designers, enthusiasts and schools. A basic configuration consisted of a Z80 CPU (produced by SGS under a Zilog license), very little RAM, a ROM monitor software, hexadecimal display and keyboard. Furthermore, on an experimental plate, small electronic experiments could be carried out, which could be managed directly by the microprocessor and programmable (Fig.2).

With this minimal componentry, operation was assured without connecting other devices. Programming took place in machine language, directing the memory cells and the internal registers of the CPU. In this way it was possible to fully understand the operation of a small computer, interacting closely with the hardware.

An expandable system

The NBZ80 system was the minimal one consisting of card and mini-terminal (i.e. hexadecimal display and keyboard).

The NBZ80-A system had the power supply available while the NBZ80-B system was an NBZ80-A inserted into a container.

The NBZ80-B system allowed a student to master microprocessor programming techniques.

At a cost of 825000 Italian Lire (Nov.1980), a NBZ80-S system (Super, the most advertised) was purchased to address problems of interfacing with external devices and the interaction between hardware and software. The technical characteristics of the NBZ80-S system are shown in Fig.3. The NBZ80-S system was expandable up to the NBZ80-HL configuration (Fig.4). The HL system had 16KB of RAM, a BASIC 8KB ROM interpreter on additional card, alphanumeric keyboard, video card and (not required) a monitor. The BASIC interpreter was provided along with the "Basic Programming Primer" manual written by Mitchell Waite (Fig.6). To save the

CARATTERISTICHE TECNICHE DEL NANOCOMPUTER NBZ80-S

Scheda base

FORMATO	Doppio europeo
MICROPROCESSORE	SGS-ATES Z80 CPU
CLOCK DI SISTEMA	2,4756 MHz
MEMORIA DI ROM	2 kbyte di Monitor NCZ80, espandibile sulla scheda fino a 8 kbyte (M2716 o M2316)
MEMORIA RAM	4 kbyte (M4027), espandibile sulla scheda fino a 16 kbyte (M4116).
I/O PARALLELO	2 Z80 PIO, due porte di 8 bit disponibili.
I/O SERIALE	Interfaccia seriale TTL, RS232C, anello di corrente 20 mA. Interfaccia registratore a cassette audio RCZ80.
BUS DI SISTEMA	Interfaccia gamma-BUS standard.

Scheda per esperimenti

- ☐ Basetta per collegamenti senza saldature con 840 fori
- ☐ 8 interruttori con logica antirimbalzo
- ☐ 2 interruttori a molla di ritorno con logica antirimbalzo
- ☐ 8 LED e driver
- ☐ 1 LED di alimentazione presente

Miniterminale

- ☐ 8 cifre a 7 segmenti LED
- ☐ 14 LED
- ☐ 30 tasti
- ☐ 1 interruttore terminale seriale/registratore a cassette

Alimentatore

- ☐ 220V ± 10%, 50 Hz
- ☐ + 5V (± 5%), 1,5A (0,5A disponibili all'utente)
- ☐ — 5V (± 5%), 0,3A (0,1A disponibili all'utente)
- ☐ + 12V (± 5%), 0,4A (0,1A disponibili all'utente)
- ☐ — 12V (± 5%), 0,3A (0,1A disponibili all'utente)

Peso e dimensioni

- ☐ Kg. 3,4
- ☐ 35,7 cm. (largh.) X 40,0 cm. (lungh.) X 5,0 cm. (alt.)

Condizioni ambientali di lavoro

- ☐ Temperatura 0-50°C
- ☐ Umidità 0-90% (senza condensazione)

Fig.3

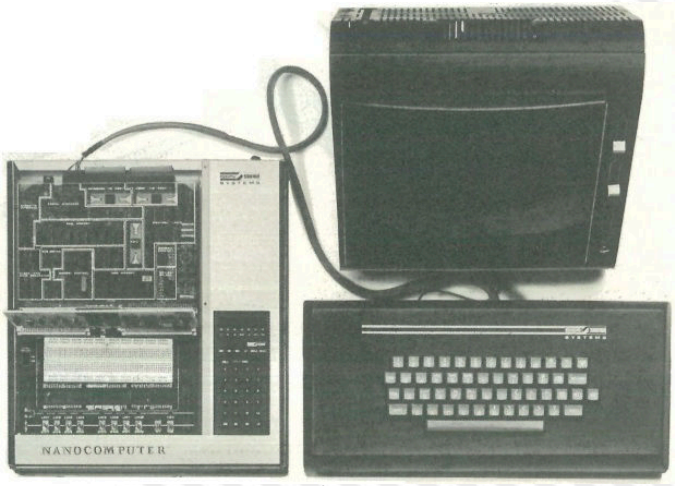

Fig.4

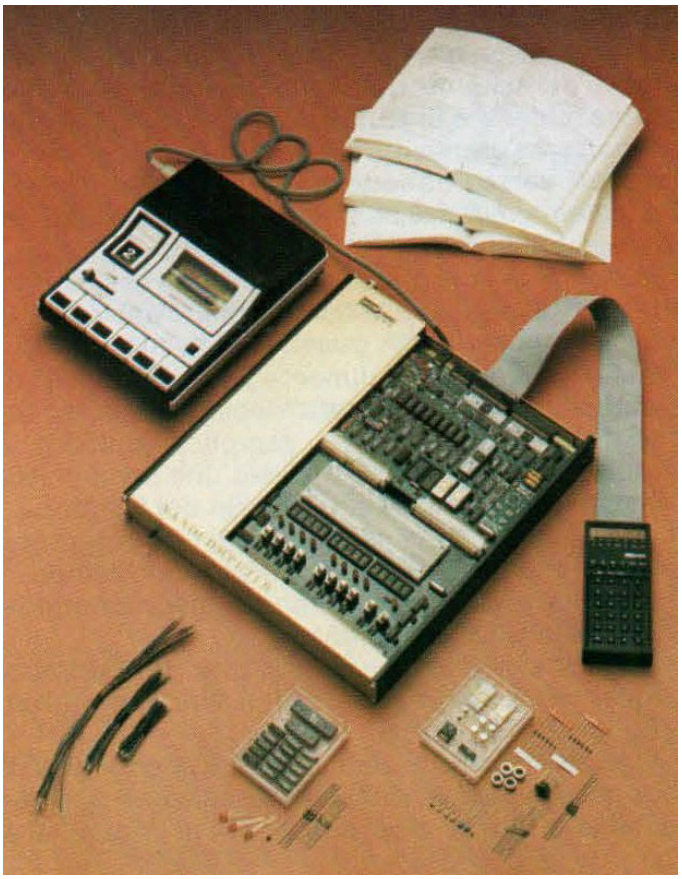

Fig.5

Fig.6

Fig.9

programs it was necessary to have an RCZ-80P cassette recorder specially adjusted for the NanoComputer (Fig. 5). The complete list of the family of components and upgrades is shown in Figs.7 and 8 [BIT22].

Being a product made in Italy, most of the documentation is written in Italian (see Bibliography at the bottom of this paper). Although many books published on the Nanocomputer were written by English-speaking authors, I could not find links to the English editions (Fig.9).
I apologize to the many readers of the English edition of RMW.

Conclusions

The NanoComputer was not the only educational system put on the market at the time. An overview of the sector referring to 1981 can be found in the papers written by Cavalcoli [BIT22a] and Alessandroni [BIT22b] in issue 22 of the Italian magazine Bit.

The owners of the NanoComputer can perform some very simple tests, following the indications of the paper published in No. 4 of the Italian magazine Bit [BIT04].

Getting a NanoComputer may prove difficult because many owners may have demolished non-functioning or unused machines because they are technically outdated.

Who has carried out projects of some interest with the NanoComputer and wants to make them known, please contact RetroMagazine World Editorial Staff.
Thank you very much.

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COMPONENTI DELLA FAMIGLIA NANOCOMPUTER

NBZ80 Nanocomputer a basso costo per l'apprendimento del software.

NBZ80-A Come NBZ80 ma con alimentatore NSZ80.

NBZ80-B Nanocomputer per l'apprendimento del software. Già previsto per le successive espansioni.

NBZ80-S Nanocomputer per l'apprendimento dell'hardware e del software.

NBZ80-HL Nanocomputer per l'apprendimento dell'hardware, del software e dei linguaggi ad alto livello (BASIC).

NBZ80-ASED Nanocomputer per l'apprendimento dell'hardware, del software e del linguaggio Assembler.

UPZ80-S Kit di parti per passare da NBZ80 o NBZ80-A a NBZ80-S.

UPZ80-BS Kit di parti per passare da NBZ80-B a NBZ80-S.

UPZ80-HL Kit di parti per passare da NBZ80-S a NBZ80-HL.

UPZ80-ASED Kit di parti per passare da NBZ80-S a NBZ80-ASED.

KNZ80 Kit di parti per convertire la scheda base in CLZ80-4/2.

NBF8 Nanocomputer per l'apprendimento del microprocessore F8/3870.

ASED 8K ROM con Assembler/Editor. Per NBZ80-HL.

BAS-Z/N 8K ROM con Interprete BASIC. Per NBZ80-ASED.

NE-Z 2K ROM con il software descritto negli esperimenti del Nanobook 3. Per NBZ80-S, HL, ASED.

NCHESS 4K ROM con programma per giocare a scacchi. Per tutti i Nanocomputer.

EPZ80-S EPROM Programmer completo con zoccoli di programmazione su scheda. Per NBZ80-S (richiesto kit K4Z80) -HL e -ASED.

EPZ80-B Come EPZ80-S ma con zoccoli di programmazione in box separato.

NDK1 Kit hardware/software di controllo motori in C.C. Per NBZ80-S, -HL, e -ASED.

NDK2 Come NDK1 ma per motori passo-passo.

RCZ-80/P Registratore audio appositamente regolato. Per tutti i Nanocomputer.

TVZ80 Monitor video B/N. Per NBZ80-HL e Ased.

SSZ80 Stampante ad impatto. Per NBZ80-HL e Ased.

K1Z80 Kit di fili già spellati. Per NBZ80-S, -HL e - ASED.

Fig.7

K2Z80 Kit di componenti per la realizzazione degli esperimenti descritti nel Nanobook 3. Per NBZ80-S, -HL, e -ASED.

K3Z80 Zoccoli di ricambio a 40 pin per la scheda per esperimenti. Per NBZ80-S, -HL e -ASED.

K4Z80 Connettori per l'espansione del gamma-BUS, sulla scheda per esperimenti. Per NBZ80-S.

NSZ80 Mini alimentatore separato. Per NBZ80 e NBF8.

ALZ80 Alimentatore +5V, 10A per espansioni con cestelli esterni. Per NBZ80-S, -HL e -ASED.

CPZ80 Cestello esterno per 4 schede. Per NBZ80-S (richiesto kit K4Z80), - HL e Ased.

CTZ80 Come CPZ80 ma per 8 schede.

PBZTEMPLATE Mascherina per diagrammi di flusso e libretto con istruzioni Z80. Per tutti i Nanocomputer.

W2Z80/P Cavo di collegamento per due registratori RCZ80/P. Per NBZ80-ASED.

W6Z80 Cavo di collegamento ad un televisore commerciale. Per NBZ80-HL e -ASED.

W10Z80 Cavo di collegamento ad un registratore RCZ80/P. Per NBZ80, NBZ80-A, -B, -S e -HL.

W12Z80 Cavo di collegamento alla stampante SSZ80 o altra tipo Centronics. Per NBZ80-HL e -ASED.

W13Z80 Cavo di collegamento per un registratore RCZ80/P. Per NBF8.

W17Z80 Due cavi piatti per collegare cestelli CT/CPZ80 esterni. Per NBZ80-S (richiesto kit K4), -HL e -ASED.

DAZ80NANOBK1/1 Nanobook 1, Tecniche di Programmazione.

DAZ80NANOBK3/1 Nanobook 3, Tecniche di Interfacciamento.

DANBZMT/2 Manuale tecnico del Nanocomputer NBZ80, -A e -S.

DANBZHLTM/1 Manuale tecnico dei Nanocomputer NBZ80-HL e -ASED (in inglese).

DABASLUM/1 Manuale del BASIC BAS-Z/N (in inglese).

DAASEDUM/1 Manuale dell'Assembler/Editor ASED (in inglese).

DANC-ZLIST/1 Listing del programma Monitor NC-Z.

DAEPZTM/1 Manuale dell'EPROM Programmer EPZ80-S e -B (in inglese).

Nota: I volumi Nanobook 1 e Nanobook 3 sono pubblicati da Gruppo Editoriale Jackson e sono in vendita anche presso le migliori librerie.

Fig.8

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MAXIM, the arcade room since 1990 - Part 2

by Mic the Biker

Hello readers of Retromagazine, here we are to resume the speech started in number 32 (10 ENG) with the interview with the good Massimo, owner of the Maxim games room in Jesolo Lido. With this second part we will take a virtual walk inside this magnificent place that will teleport us directly in the golden years of the coin-ops and beyond. After all, this is one of the few places that have never given up, already in the interview we understand that we are in front of a person who exudes passion, that of a "former boy" who has cradled, raised and kept this love in his heart all his life until today. Personally I attended Maxim in the 90s, when it was enough to turn around to see coin-ops everywhere. It's always a dip in the heart to get in, because those walls are the same. The floors could tell stories of life, of people who entered them as children and come back as adults. The Maxim exudes golden age: it is not new, it is not adorned with lights and neon lights that make it so vintage. It is a place where the light is what it must be, in some corners almost dark. A place where vintage is made by the objects kept inside, such as old wooden chairs of the cinemas of the past, the car plates hanging on the walls. Objects with a voice, with a true story to tell. And as you stroll lulled by litany in chip sauce you are kidnapped by the old games, not just the electronic ones. Massimo is someone who knows, has not smelled the business and got into it. He's the one who grew up in those walls, in the middle of the coin-ops. His passion led him to have items in his games room that are beyond any fashion or return of flame. I took the opportunity to ask him for a great help to tell me the secrets of electromechanical games.

Peppy the musical clown – 1956

Here's an electromechanical game from Williams. It was designed for younger children, who could make a famous puppet dance at the time. The clown moved his head from side to side, while the player pressed the buttons on the front console that controlled the movement of the arms and legs to the rhythm of the organ music produced by the machine.

Ten Strike Classic – 1957

Ten Strike Classic is a reissue and faithful copy of the famous Williams Ten Strike, dated 1957. It uses cabinets and graphics identical to the original, but has LED-style score displays instead of mechanical rollers. The sound

is produced by two bells, for one and ten points. Scores can be changed via a switch, from regulatory bowling to the original Williams Ten Strike.

Little Pro – 1964

Very rare game designed by Harry Williams and produced by Southland Engineering (Santa Monica, California). Perhaps the only game produced by this company that was very similar to another game called Mini Golf produced by Williams. The purpose of the game was to complete the 9 holes present by controlling the movements of the golf player. We have a maximum of 27 shots and each hole is PAR 3. The game ends when the player completes nine holes or 27 hits are made. There is a single motorized step-by-step unit that displays the number of holes made. A free game can be won if the player performs all nine holes with 18 hits or less.

Bear Hunt – late 1960s

Bear Hunt, or more commonly known as Bear Shooting, is the Italian reproduction built in Bologna of the most famous Seeburg Shoot the Bear of the late 1940s. It is an electromechanical game with valve technology, as well as the audio that reproduced the scream of the bear when

it was hit. The purpose of the game was to hit as many times as the bear that was being chased by a dog, very similar to Disney's Pluto. To do this we had a total of 20 shots: every time the trigger was pulled, a shot was scaled. At the same time a beam of light was emitted from the barrel of the rifle. The bear had three lenses, one on each side and one on the belly: one of the three lenses had to be hit with a beam of light. If struck, the bear would stand on its hind legs and growl; then it would come back on all fours and start running again. The real masters of this game managed to keep it booming as much as possible by hitting it repeatedly.

Palla Cesto (Basketball) – 1960s

Classic 60s Italian ball distributor from Munich that could be found near some newsstands or bars of the time. He delivered balls with surprise but was also allowed to play a game at the mini bingo.

Whirly Bird – 1969

Produced by Midway Manufacturing Company Illinois U.S.A. in 1969. This is an electromechanical game of skill: flying a helicopter you had to hit the temples that gradually lit up. A very popular game in those years and still appreciated by young and old people.

Helicopter Sega – 1968

Game produced by Ltd Tokyo Japan in 1968. This is also electromechanical with audio on magnetic tape. The purpose of the game is to land on the most famous airports of the time. Each time we land on one of the six circular bases it will light up and we will be credited with points. These are visible at the bottom of the cab, using a roller system.

Maxim and coin op

Obviously in the midst of these collectibles, not easy to find around, Massimo is bringing back to life the immortal old coin-ops of the golden age. Many are just sleepers in his warehouse, others are real targeted research. The faint of heart must pay attention, for a harmless walk within those walls could turn into a series of repeated fainting. The first coin op I saw exhumed was BUBBLE BOBBLE in 2017. The retrogaming craving had not yet

exploded, so I was literally shocked to see the Bub & Bob dragons in a game room. It was in the back, a bit hidden by modern sparkling amenities. I was walking, to pass the time while my son was playing something: when I saw him I was petrified. A train of memories fell on me all together, memories of beautiful summers spent in Jesolo with friends, all around the cabinet, alternating in the games. They had to come and get me because I was not coming out of that corner, and when I left I congratulated Massimo for having exhumed this masterpiece.

Out Run

Another crazy piece, kept in such a way as to look brand new, is the vertical cab of OUT RUN. Getting close to this coin op is something sacred, it is a gesture that brings to mind incredible years and emotions never dreamed of. Squeezing that steering wheel is a total shock, it's the beginning of a journey through time. There is a detail in this cabin that takes your breath away: at the top of the steering wheel there are two ashtrays, of the chrome ones that were riveted a posteriori. They are like graffiti in a cave, only the symbol of an era in which the arcades were constantly wrapped in smoke: you lit your cigarette, started the game and put it there, while its lazy white column gave you that unique atmosphere. Right on that shelf we find the drawing of the map that branches off, placed there to make us understand the roads that we could take, but it was almost impossible to distract ourselves to look at it. But it guided us towards the final five goals, while with one hand we held the steering wheel and with the other the gearbox.

Pac Man

Another authentic piece of history you can find at Maxim is PAC MAN. Its yellow Midway cabinet is impossible not to notice and is in an amazing state of preservation. By heart I never played Pac Man in its original version, it was always inserted in some other "universal" cabinet. Of course, the game is always that but playing it here is an added value: on the sides of the screen we will find the game instructions and the table with the value in points of enemies and bonuses. Driving our yellow ball is also easier here, as control was born for this game and only for this one. The coin slot that still reads 25c is priceless.

Super Sprint

Also in the area we find another piece from ninety, a game that has enjoyed generations of players: SUPER SPRINT. The Atari cabinet certainly does not go unnoticed: its size and the three staggered steering wheels are impossible not to notice. Here too we find ourselves in front of an almost perfect cabinet, with only a little paint missing on the coloured bases near the buttons to participate in the challenge.

I think that if this cab could talk he would tell us about millions of punches received when, turning the steering wheel wildly, he was going to clash against some obstacle, losing positions.

Space Invaders

This immortal masterpiece, pioneer and leader of a genre, certainly does not need to be presented. Here at Maxim you can see a version not so common in our parts: a dizzying cocktail table! Created by Tomohiro Nishikado and published in 1978, Space Invaders is one of the very first shooter games, initially released as a vertical arcade, and later developed in the version you will find from Massimo. It is in an exceptional state of conservation: the elegance of the wood and the thick glass that makes up the table top frame the iconic and timeless graphics. The two plates with the game instructions placed next to the monitor and the controls at the bottom make this piece a must for all video game lovers.

Time Traveller

A very fresh New entry is a very special cabinet, which I have honestly seen yes and no a couple of times in my life, or Time Traveller. It is the first holographic video game produced, as described in "The illustrated history of electronic games". The story was created by Rick Dyer, former creator of Dragon's Lair, and published by Sega in 1991. And just like its illustrious and famous predecessor, Time Traveller is also an interactive film game on LaserDisc.

The dynamics are quite similar: we should move the joystick in a specific direction or press the button at certain points in the game. With the correct command a video is played showing the character's progression in the adventure, while the wrong move will inevitably lead to death. We said earlier that we are facing a holographic game, something science fiction for the time. But how do you get a similar effect? A unique cabinet is used, created ad hoc, which projects the characters using reflection. The "holographic" effect, in truth, is an optical illusion obtained with a large curved mirror and a 20-inches CRT television: the characters seem to be in mid-air as images about 5 inches high. This space, where the action takes place, is called Micro Teatro, a flat and dark stage invented by engineers Steve Zuloff and Barry Benjamin. A couple of geometric neon constructions, placed in the back, act as a background for the game.

Biker thoughts

Entering Maxim is a bit like watching a Super Quark show (italian science dissemination tv programme, Ed.N.). We can find artifacts from a historical period fundamentally close to us but technologically centuries away. You can review and above all replay the issues that have written the history of this fantastic world, all enclosed in their original cabinet. For the new generations it is the discovery, live, of what was the video game world of the past and Massimo confirms that many children ask where the old games are. He, as a great enthusiast, is always ready to guide anyone towards these treasures and to explain the history of them. It is beautiful to see young and otherwise young people running towards history, to relive it or to discover it: it is made of 320×224 pixels and it will be forever.

Retro Interview – discovering new talents...

by Ermanno Betori

Recently we are witnessing a rediscovery of old computers by an increasingly younger audience than the average population of "grandparents" like us who were lucky enough to live the twenty years 1975-1995 when there was the explosion of mass computing. Those who bought a computer at the time, especially in the decade 1975-85, were in their own way a dreamer/explorer in that they thought that thanks to the computer they could realize the most disparate enterprises (also guilty were movies such as War Games, Tron, Electric Dreams etc... that influenced the audience; suffice it to say that after War Games the modem market in the USA suffered a 500% increase... In practice all the boys of the time dreamed of hacking the NORAD - lol).

Fig. 1 - Example of an 80s computer, the C128D-81

Something similar to what happened in America in the 1950s where nuclear energy was seen as the future. In fact, you think that they sold as a game for children a mini nuclear laboratory containing real radioactive minerals considered today the most dangerous game in the world omitting swords, bows, slingshots, rockets, air guns etc.. that is, games that by their intrinsic nature were born to injure.

Today we have hyper-powered computers with amazing computational and graphical-sound capabilities, very easy in the predetermined use of various programs (many times preset by the manufacturers) but strangely a bit difficult for those who want to use the computer outside the pre-established schemes. So you are having a kind of retro renaissance where we find new graphics,

Fig. 2 - Atomic Energy Lab... maybe a bit dangerous...

musicians, programmers who are putting themselves back into the game using over 40 y.o. computers obtaining excellent results were considered impossible at the time.

Therefore we will start a series of retro interviews with these new retro users who are distinguishing themselves in the world of Indie, Demoscene, Programming etc.

We had the pleasure of meeting Frida Katarina as a graphic designer using Commodore 64, creating her drawings in PETASCII and this is her retro-interview!

Greetings to all the friends of RetroMagazine!

My name is Frida Katarina. Thanks for inviting me to this interview. I was born in Sweden in 1981. My first computer was not my own, but my cousin's. She had a Commodore 64 in the 1980's and I was allowed to play games on it.
Mostly I liked the music very much. I later moved on to consoles (NES, S-NES) instead of computers to play videogames, but I never forgot the unique SID music of the Commodore 64.

Many years passed and I somehow discovered SLAY

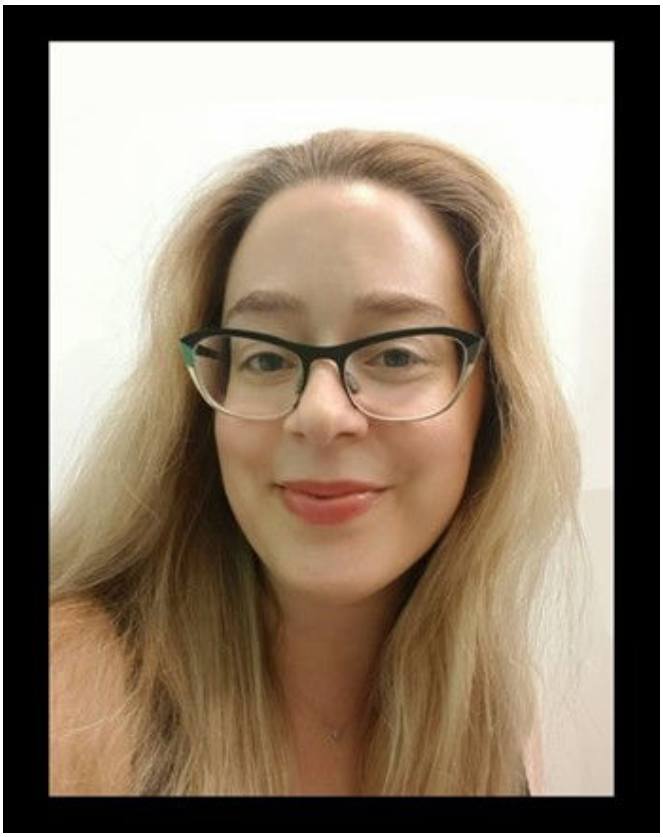


Fig. 3 - Frida Katarina

Radio that played a lot of C64 remixes, many of them very well made. I was intrigued and curious about how to become a remixer myself. It was first around 2020 that I found and became active in C64 groups on facebook. I bought a piano, learned how to play some video game music, and posted some poorly recorded C64 tunes in the facebook groups.

These piano videos got some positive attention, but soon after this my piano broke down (and was returned to the shop for service, which took 6 months!) and I couldn't get started on making remixes the way I had planned.
So I found a facebook group that was dedicated to PETSCII art, and I decided to try it. This was around March 2021, and some of the screens I made received a lot of praise, and people asked me to upload them to CSDb. So I guess that's how I became a demoscener.

I never really became a computer enthusiast per se, but rather a retro enthusiast in general. I have never owned a Commodore, the closest thing is TheC64, which I got in 2020. For PETSCII art, I have only used the online editor http://petscii.krissz.hu/ and for Multicolour art https://mcdraw.xyz/ so far, and now I am trying out Multipaint. I have enjoyed working with PETSCII the best, there is an interesting challenge to use the character set this way.

I think the Commodore 64 - its colours, its sounds - it all has a certain charm, and not only for the nostalgia. And there is a lot of inspiring C64 artwork out there. You can see mine at CSDb:
https://csdb.dk/scener/?id=35587

My goals in the retro computer world?
Well it has been really nice to be able to reach people all over the world with my art. Other than trying to make C64 remixes, I would also like to try to compose for the SID chip!

https://csdb.dk/release/?id=201668
https://csdb.dk/release/?id=204826
https://csdb.dk/release/?id=205286
https://csdb.dk/release/?id=204122

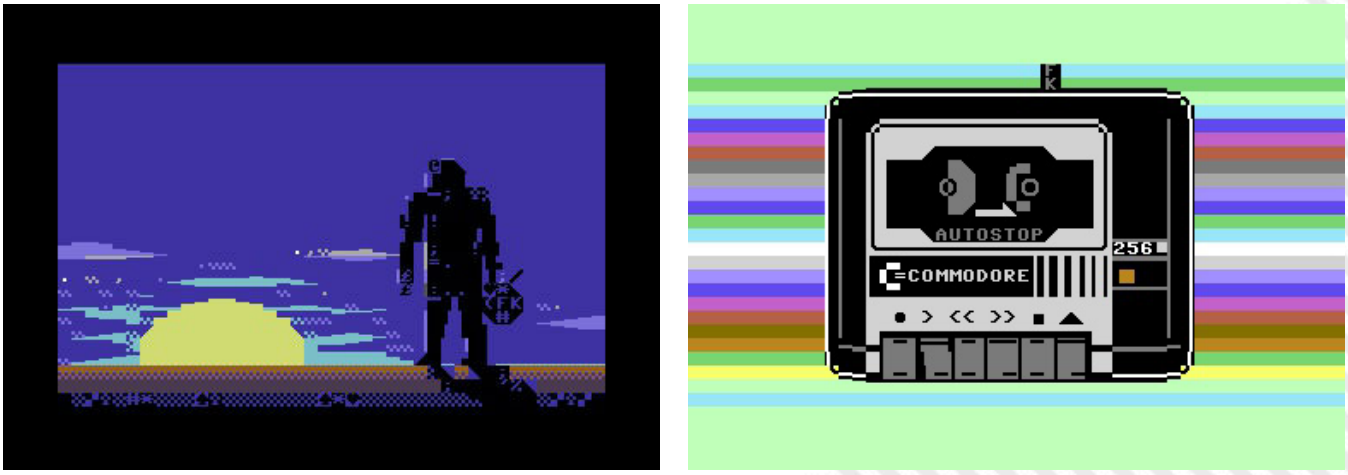


Fig. 4 - Two of Frida's works of art

Questions and answers with 6502 processor co-creator, Bill Mensch, on the microprocessor that powered the Atari 2600 and the C64

by Carlo Nithaiah Del Mar Pirazzini

Few people have seen their work affect the world more than Bill Mensch.

This man contributed to the creation of the 6502, the microprocessor of the 8-bit era, launched in 1975 and which was the heart of systems such as the Atari 2600, Apple II, the Commodore 64. Mensch also created the input/output chip VIA 65C22, known for its functionality and crucial to the popularity of the 6502, and the second-generation 65C816, a 16-bit processor that powered the Apple IIGS and the Super Nintendo.

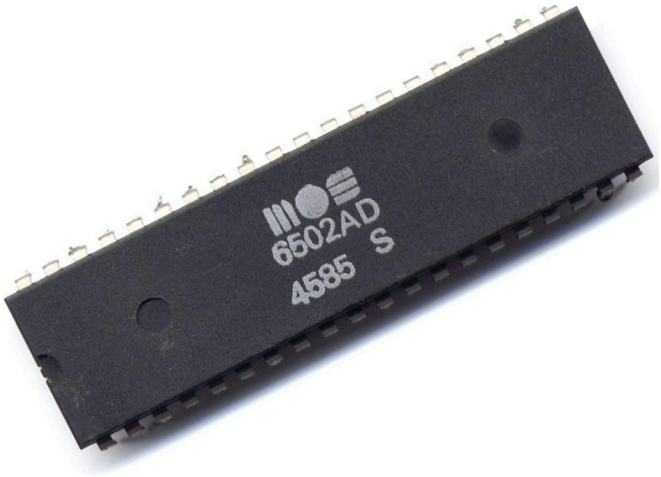


Fig. 1 - Microprocessore 6502

Many of the 65x series chips are still in production.

Processors and their variants are used as microcontrollers in commercial products and remain popular with hobbyists who build “personal” home computers.

The wave of interest for retrocomputing has led people once again to exchange tips on how to write refined games using assembly code 6502, with the release of new titles for Atari , BBC Micro and other machines.

This interview has been condensed and modified for clarity.

Nith : What drove you into engineering?

Bill Mensch: I went to Temple University in Philadelphia on the recommendation of a guidance counselor. When I arrived, I discovered that they only had a degree in technological engineering. But I didn't know what I was doing, so I thought, let's finish our degree.

Then I got a job (1967) as a technician at Philco-Ford (TV producer) and noticed that engineers earned about twice as much. I also noticed that I was helping the engineers understand what Motorola was doing in the high-voltage circuits, which meant that Motorola was the leader and Philco the follower. So I went to the University of Arizona, near where Motorola was, I graduated in engineering (in 1971) and I went to work for Motorola.

N: How did you come to develop the 6502?

BM: Chuck Peddle approached me.

He came to Motorola two years after me. Now, this hasn't been written anywhere that I know of, but I think his intention was to “raid” Motorola for engineers. He worked with me on the peripheral interface chip (PIA) and got to see me in action. He decided that I was a young “rampant” engineer who was just the guy to follow his “ego.” So Chuck and I formed a sort of partnership. He was the system engineer and I was the semiconductor engineer. We tried to start our company together with other “Motorola bad boys” and when that didn't happen, we joined an existing [semiconductor design] company, called MOS Technology, in Pennsylvania in 1974. That's where we created the 6501 and 6502 (in 1975), and I designed the input/output chips that accompanied it as the Intel 4040 microcontroller Chipset, sold for about $ 29 at the time. We weren't trying to compete with the 6800 or 8080

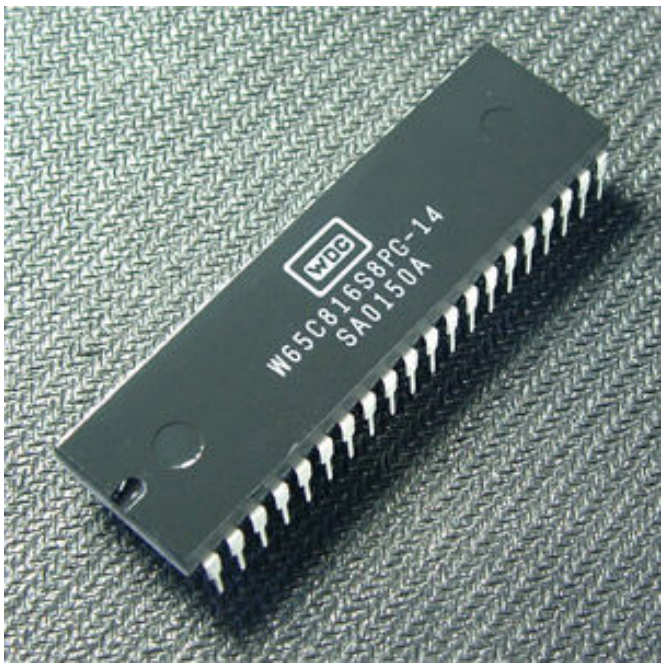


Fig. 1 - Microprocessore 65C816

Fig. 3 - Bill Mensch, co-creatore del microprocessore 6502

[chips designed for more complex microcomputer systems].

N: The 6502 has become the foundation of many microcomputer systems, and if you look at books about contemporary programmers, they often talk about the quirks of the architecture and instruction set of the 6502 compared to other processors. What drove these design decisions?

BM: Rod Orgill and I had completed some microprocessor projects before 6501/6502.

In other words, Rod and I already knew what happened in a set of instructions. And the lower cost was the key. So we looked at the instructions we really needed. And we figured out how to have addressable registers using zero page (the first 256 bytes in RAM). So you can have one byte for the operating code and one byte for the address and the code is compact and fast. There are limitations, but compared to other processors, page zero was a big problem.

N: Many pages of those programming books are dedicated to explaining how to use the versatile VIA chip (interface adapter) and its two I/O ports, built-in timers, a serial scroll register and so on. Why so many functions?

BM: I had worked on the previous PIA chip at Motorola. This meant that I understood the needs of real systems in real-world implementations. While we were working at MOS, Chuck, Wil Mathis, our app guy, and I were eating atArby's one day, and we talked about doing something beyond PIA. And they said, "We'd like to put in a couple of timers. We'd like a serial port, "and I said,"Okay, we're going to need more log selection lines. " And our notes ended up on an Arby napkin. I left after eating and I designed it. Then I had to redesign it to make it more compatible with the PIA. I also made some changes at Apple's request. The interesting thing about the GO-AHEAD is that it's the most popular chip we sell today.

N: After MOS Technology, in 1978 you founded The Western Design Center, where you created the 65C816 CPU. The creators of the arm processor give a visit to WDC the confidence to design their own chip. Remember that visit?

BM: Yes! Sophie Wilson and Steve Furber visited me and told me about the development of a 32-bit chip. They wanted to bypass what Apple was said to be doing. But I was finishing 816 and I didn't want to change horses. So when they were successful with arm, I cheered for them because it wasn't something I wanted to do. But I left them with the idea, "Look, if I can do it here, there's

Fig. 4 - Sede della MOS Technology (immagine da Google)

two of you, there's one of me."

N: The 6502 and 816 are often found today in other forms , both as the physical core of a system-on-a-chip, and running on an FPGA . What are some of the latest developments?

BM : I'm excited about what's happening right now. It's more exciting than ever. I just got these 6502 flexible thin film prints from PragmatIC! Our chips are in the IoT devices and we have new teaching cards coming out.

N: Why do you think the original 65x series is still popular, especially among people who build their own personal computers ?

BM: Pure Love! There is a love for this little processor that is undeniable. And the reason is that we filled it with love while we were designing it. We knew what we were doing. Rod and I knew from our previous experience with the Olivetti CPU and other chips. And from my work with I/O chips, I knew how computers were used in the real world. People want to work with 65x chips because they are accessible. You can trust them and their technology.

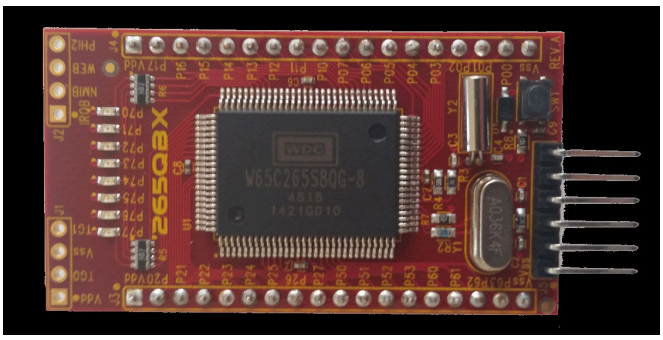


Fig. 5 - Il microcomputer MENSCH™ (codice W65C265QBX) è un piccolo computer a scheda singola (SBC), 1,25" x2.25", che utilizza il System on a Chip (SoC) W65C265S MCU, inventato e progettato da Bill Mensch.

To know more about su Bill Mensch:

https://en.wikipedia.org/wiki/Bill_Mensch

https://www.embeddedcomputing.com/technology/storage/2017-top-embedded-innovator-bill-mensch-ceo-and-founder-western-design-center

Amiga OS 3.2 - Test and Installation guidelines

by Carlo Nithaiah Del Mar Pirazzini

Hyperion Entertainment CVBA has released in May this year the AmigaOS 3.2 for all Amiga based on 68k.
A new version of the famous operating system that presents 100 new features, many updates that cover the system components and a series of bug fixes present in the previous version 3.1.4.
The result of 2 years of intense work by a team of sixty people who helped produce this new piece of Amiga history.
The full version is available on CD ROM and contains all

Kickstart disks and ROMs for all machines produced, allowing users to install AmigaOS 3.2 on multiple different types of Amiga at the same time.

A downloadable version is also available in digital format.
You can buy it all here:
https://www.hyperion-entertainment.com/index.php/where-to-buy/dealers

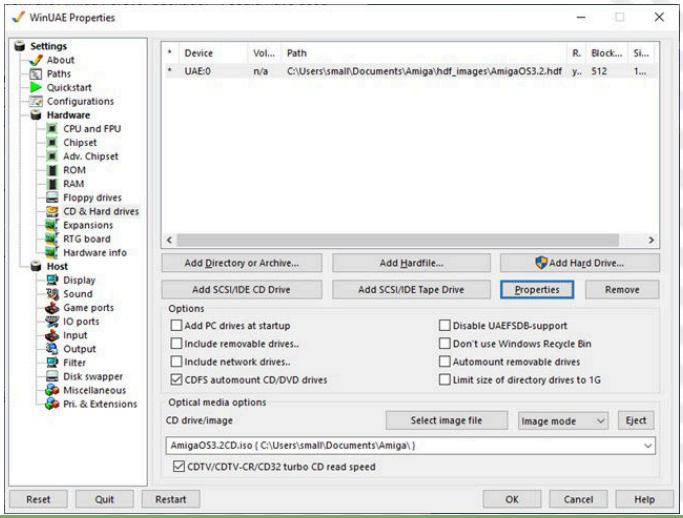
Let's take a look at some of the features of Amiga OS 3.2 that immediately jump to the eye.
Integrated ADF management: a long-awaited feature because it allows the user to create, mount, insert and eject ADF files.
Basically those images are handled as a physical floppy disk, and you can mount an image to the workbench by simply double-clicking on it.
They can be managed by shell with a wide set of options available.
Access to these mounted disk files requires very little memory and you can also mount multiple ADF images at the same time.

There is an improved user interface that allows window resizing from any border, window iconification and customization of the title of the workbench bar.
Zoom in on a window by holding down the shift key and clicking on the zoom gadget on the window.
Off-screen windows are a configurable default setting.
There is a look of the most recent menus and it is possible to customize everything through the interfaces in the "PREFS" folder.
Among the tools and utilities I point out HDToolBox that can now work from read-only media where necessary.

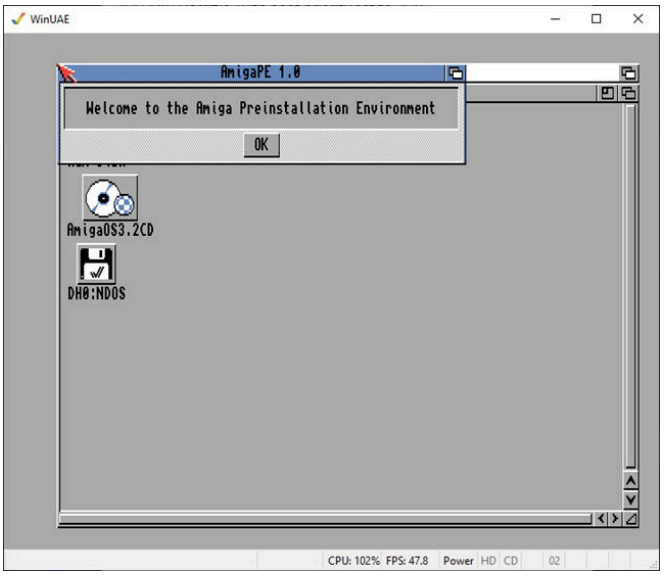
But the list would be really endless to be able to list all the hundreds of innovations made (new commands, more accessible media, new sets of functions, a better bootmenu, etc...).
The product is aesthetically pleasing and easy to install both on real machine and on WinUAE emulation.
All we have to do is promote it with full marks and advise you to buy it.

INSTALLATION ON WINUAE

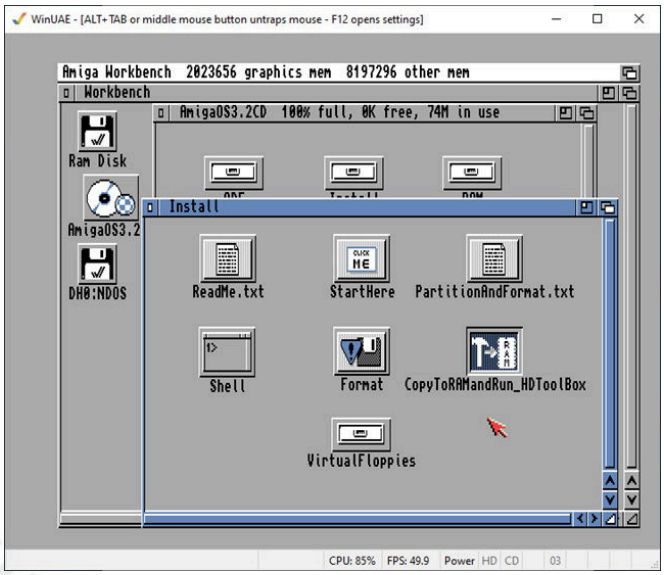
Basic A1200 Configuration + 8mb Z2 RAM
3.1 KS ROM (from the Amiga Forever package) – We could have used the 3.2 ROM directly from the CD but for this test we limited ourselves to a faster test.
100 MiB hardfile, with boot priority set to -128 and controller set to “UAE (uaehf.device), in“RDB COMPLETE ”mode
Image of the CD mounted as a .iso image, which I had created from my CD.
Let's make sure the box “CD/DVD drive with CDs auto-mount” is checked.



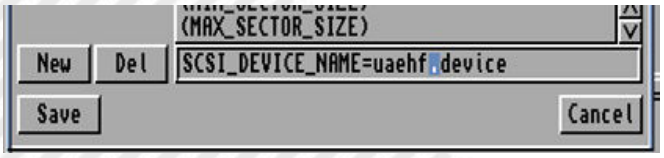
Why mounted like .iso? Since my A1200 has the cd drive with a lens problem (which I have to repair), I will be able to load it onto a CD drive and mount it using something like ImageMount, and then install it from there. The hard disk boot priority has been set to -128, so it should start from .iso directly.



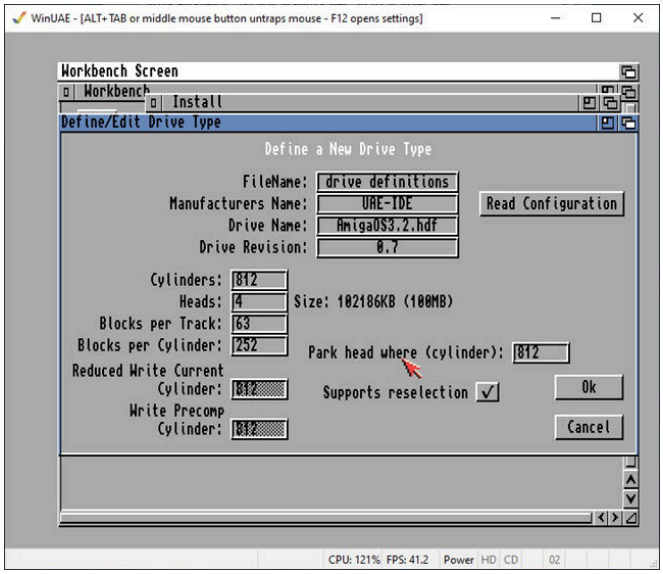
When we open the AmigaOS3.2CD icon, we find an “install” folder. Launch CopyToRAMandRun_HDToolBox



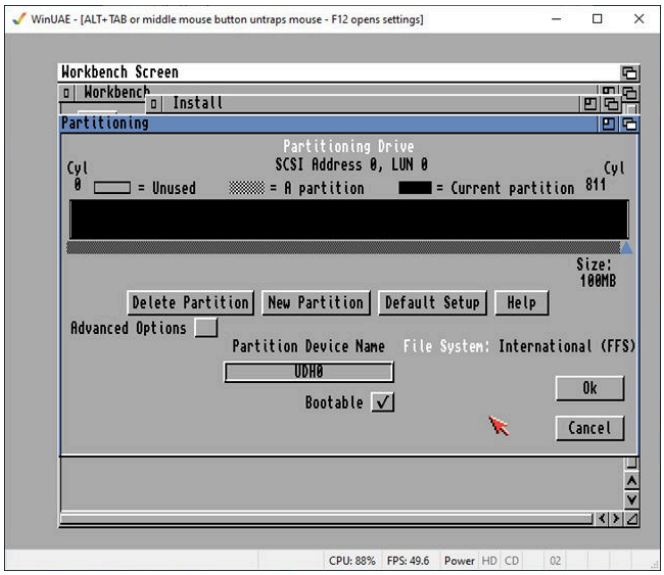
In Ram Disk we will find HDToolBox. Because we selected the HD controller as the UAE device, HDToolBox can't find the drive. We click in the Ram disk, and with the right button on the icon we go at least information.
Here we change SCSI_DEVICE _NAME to uaehf.device, press enter and then save.



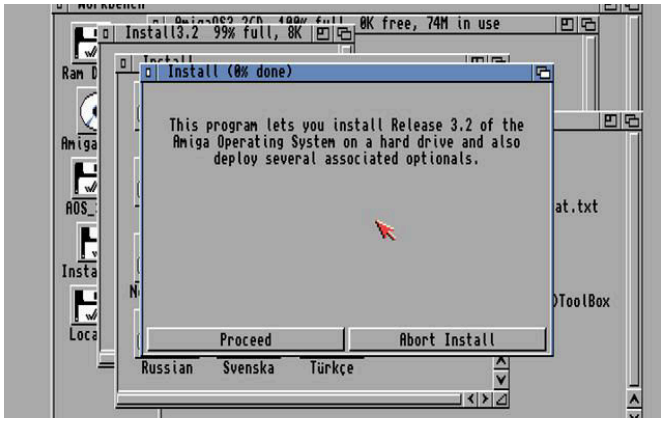
At this point by clicking on HDToolBox we will find our hard drive. We change the type of unit by defining the "DEFINE/EDIT Drive Type" parameters.



Let's click on ok and create a drive type and partition it as we see fit.

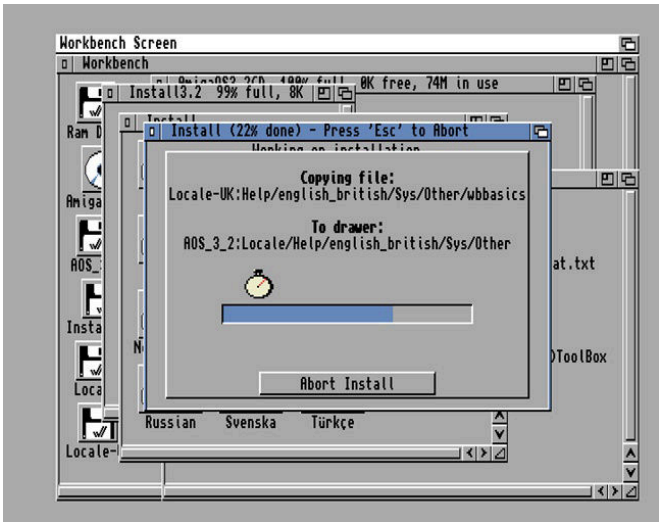


We click "OK", then "Save to Device", then exit and restart. Restart the system and go to the disk created, click on "format" and perform a quick format, giving a name to the volume. Finally we can start the installation!
Launch the iso image and click on the "Start here" icon, which will mount the Install3.2 disk; let's open it and click on Install. We choose the language and eventually we will get to the installer:

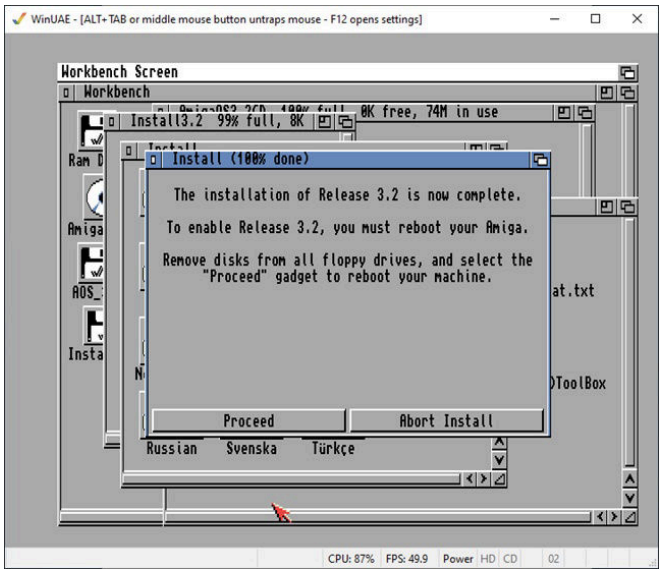

Install3.2 99% full, 0K
0K free, 74M in use
Install (0% done)
This program lets you install Release 3.2 of the Amiga Operating System on a hard drive and also deploy several associated optionals.
Proceed
Abort Install
Russian
Svenska
Türkçe

We proceed and follow the questions that the installer asks us. I have chosen default settings and click “yes” for GlowIcons.

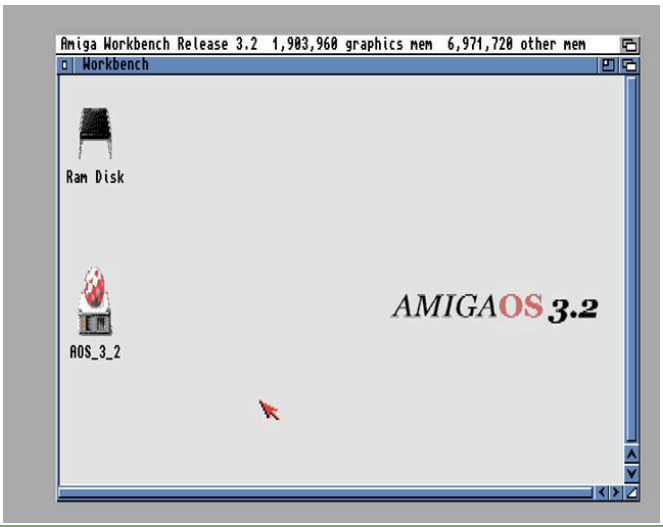
The copy has been very fast and will automatically mount all the disks quickly and automatically.



At the end it will look like this:

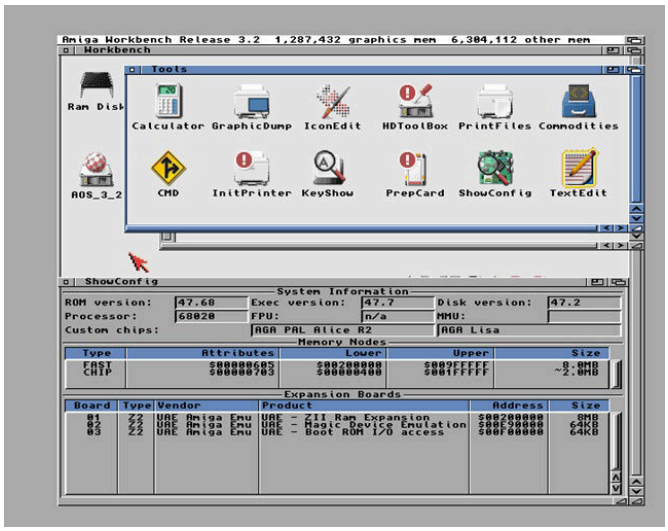

WinUAE - [ALT+TAB or middle mouse button untraps mouse - F12 opens settings]
Workbench Screen
Workbench
Install3.2 99% full, 8K
0K free, 74M in use
Install (100% done)
The installation of Release 3.2 is now complete.
To enable Release 3.2, you must reboot your Amiga.
Remove disks from all floppy drives, and select the "Proceed" gadget to reboot your machine.
Proceed
Abort Install
Russian
Svenska
Türkçe
CPU: 87%
FPS: 49.9

Press F12 and return to the configuration menu. Eject the cd image and check in the disk setting that the boot is active on the disk itself. Let's reboot.

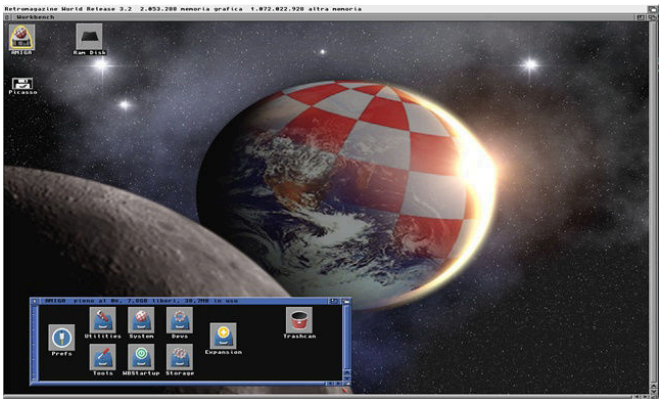


This is it. The version we see has a low resolution and few colors on the screen, but is all settable from the menu of preferences (we know the language in Italian).

Interesting if you want to use RTG emulated as the PICASSO96 that allowed me to go in 1920 x 1080 and installed quickly and without problems.



Below you can see my PICASSO96 emulated workbench.



Useful information:

You can purchase **Amiga OS 3.2** from:
https://www.hyperion-entertainment.com/index.php/where-to-buy/dealers

ZX MASTER MIND

by Roberto Zaffanella

Master Mind: The Boxed Game

The game, in the classic version, consists of a game board and colored pegs of two types:

- The first type, they are the largest and are of 6 different colors, they are used for the composition of the secret code and the attempt codes.
- The second type, they are smaller and black and white, are used for the composition of key codes.

(In the image below, my box in the 8 colors variant purchased in the early 80's)

Rules OF the game

The Master Mind is a logic game where two players alternate in the roles of Encoder and Decoder.

The Encoder is the one who chooses and hides the secret code and the Decoder is the player who must guess it.

The goal is to guess the Secret Code in as few attempts as possible.

The two players will decide at the beginning how many games to play and at the end they will compare the sum of the attempts. Whoever gets the smallest number wins.

The secret code consists of four colorful pegs kept hidden by a lid of the game board.

The Decoder for subsequent attempts will play codes, also composed of coloured pegs and the Encoder will put Black and White Key Pegs for each attempt.

Based on the Encoder's responses, the Decoder will decide the next Code to play.

The Key Codes in response to each attempt follow these rules:

- As many black pegs as are the colors of the Attempt Code that are present in the Secret Code and that are also in the right position.
- As many white pegs as there are colors in the Secret Code but they are in the wrong position.
- No Key Pegs for the colors of the played code not present in the Secret Code
- Note: The Black and White Pegs indicate the amount of colored pegs in the Secret Code but not their location.

To avoid errors in the answers in case of repeated colors, it is preferable that the Encoder first put the black pegs and then the white pegs, paying attention to the latter to exclude the colors already considered in the answer of the black pegs.

In the following example the Encoder puts only one black pin for the blue present and in the right position. No white pegs for the other blue.

No other pegs for other colors as they are not present in the secret code

Possible secret code combinations

In the classic version, the total number of possible Secret

Codes is calculated according to the formula of the combinatorial calculation of the Arrangements with Repetition: D=nk where in our case, n is the number of colors and k is the number of positions where the colors can be placed, therefore 64 and that is 1296 possibility of secret codes.

For convenience, even if inappropriately, these dispositions will be called combinations.

There are other variants of the game with more colors and positions or easy versions with fewer colors/positions for children.

In the classic version the colors are white, blue, yellow,

black, green. The 8-colour variant adds orange and brown. Compared to the colors of the boxed game, the colors used by the program are those of the ZX Spectrum: blue, red, magenta, green, blue and yellow. The black and white colors are used only for key codes.

Game modes and options of the "ZX Master Mind" program

The following options are available from the program menu:

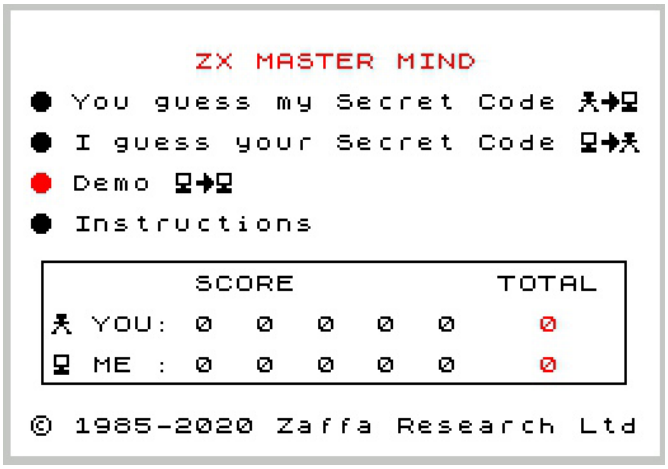
• Player guesses the secret code randomly chosen by the program

• The program guesses the secret code chosen by the player

• Demo Mode – The program guesses a random secret code

• Instructions

Below the menu is the score for the games played between the player and the program.


ZX MASTER MIND
You guess my Secret Code
I guess your Secret Code
Demo
Instructions
SCORE TOTAL
YOU: 0 0 0 0 0 0
ME : 0 0 0 0 0 0
© 1985-2020 Zaffa Research Ltd

Here are the details for each option:

The player guesses the secret code

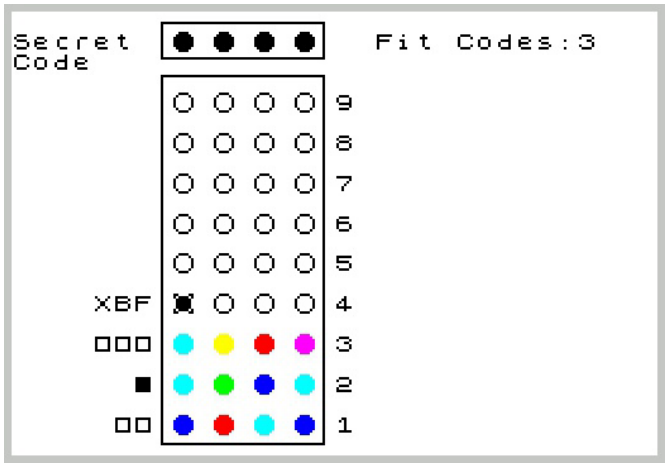
The player is the decoder and the program is the encoder

The program will choose a random secret code that will be kept obscured at the top of the table.

At each attempt by the player, the program will assign a key code (black and white pegs).

The "X" option quits the game and returns to the menu.

For options “B” and “F”, see paragraph: “Options F and B”



The top right displays the "Fit Codes" which are the number of secret codes remaining after each attempt.

The program guesses the secret code

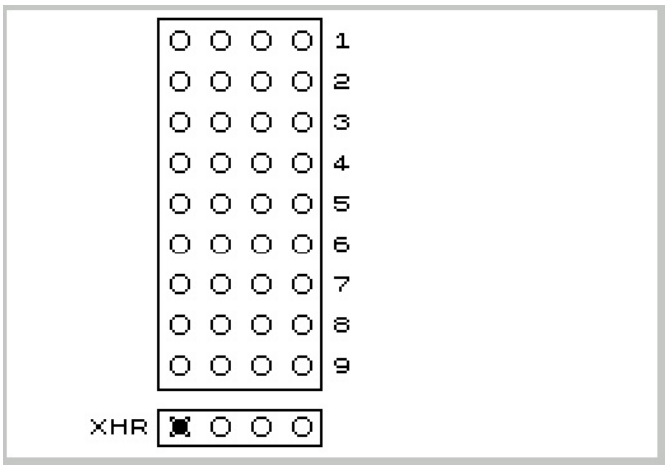
The program is the decoder and the player is the encoder.

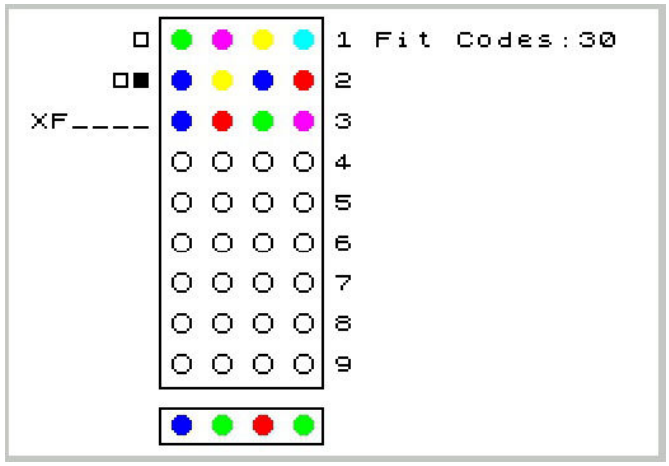
At the beginning of the game the player has three possibilities to choose the secret code:

1) Choose a color for each position

2) Use the “R” (Random) option to generate a random secret code

3) Use the option "H" (Hidden) to not enter your secret code but write it on a sheet.





After entering the secret code, the program will start playing the first attempt to which you will have to provide a key code.

The "X" option quits the game.

Option "F" will be discussed in the paragraph: "Options F and B"

The program guesses a random secret code – Demo Mode

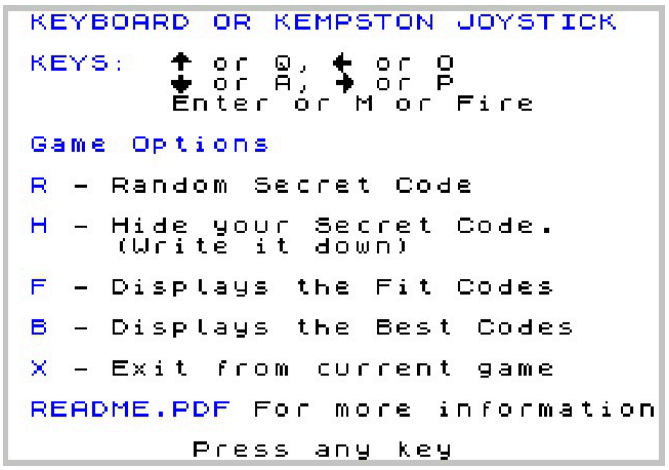
The program will play as both Encoder and Decoder.

He will randomly choose a Secret Code and play until he guesses. This mode can be used to understand how the game is played.

Instructions: Using the Kempston Keyboard and Joystick

To select the colored pegs and program options, use the

cursor keys or the Kempston Joystick.
The choice is confirmed with the "Enter" or "Fire" button on the Joystick.
When playing with a Spectrum with rubber keys it is better to use the alternative keys: Q A O P as cursor keys and M as ENTER.


KEYBOARD OR KEMPSTON JOYSTICK
KEYS: ↑ or Q, ← or O
↓ or A, → or P
Enter or M or Fire
Game Options
R - Random Secret Code
H - Hide your Secret Code.
(Write it down)
F - Displays the Fit Codes
B - Displays the Best Codes
X - Exit from current game
README.PDF For more information
Press any key

Using an emulator of the ZX Spectrum for Android it is preferable to choose as input device in the preferences the "cursor keys".

Load and run the program

For ZX Spectrum emulators, open the auto-start file MMEMUXX.TAP (XX is the version).
It has been tested with Fuse for Windows, Speccy and Unreal Speccy for Android.
For the ZX Spectrum, the classic LOAD "" and then play the MMVAWXX.WAV file from an MP3/Smartphone/PC player connected via Jack cable to the "ear" port of the Spectrum. Tested on my ZX Spectrum +.

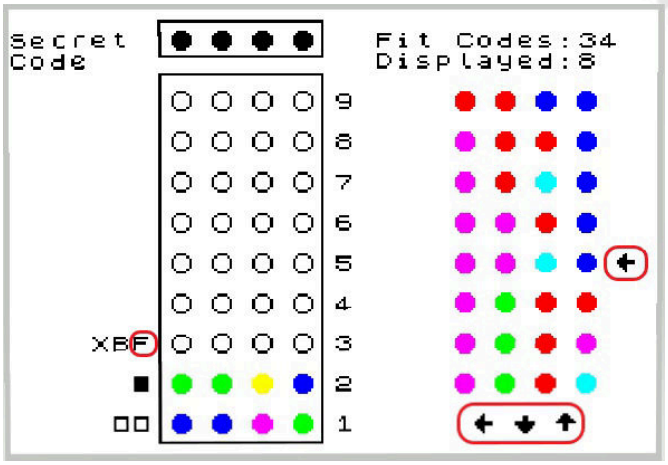
Options “F” and “B”

These options are not necessary for the normal course of the game, however they can be used if you are struggling to find a code or to improve your game strategy.

“F” option (Fit Codes)

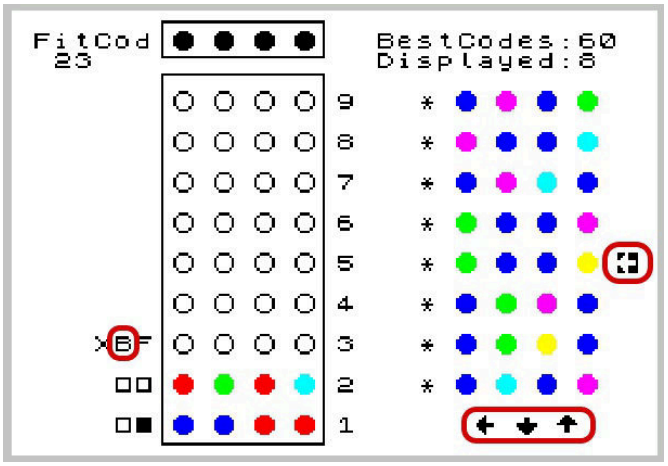
This option displays the possible secret codes called by the Fit Codes program. Among them is the real secret code.
The top right shows the total Fit Codes and how many were displayed.

They are displayed in groups of eight. Move to the next group using the “Down” arrow key.
The "Up" arrow enables a cursor that can scroll through the list of fit codes to choose the attempt code that must then be confirmed with the ENTER key.
To go back, press the left arrow cursor key.



Option "B" (Best Codes)

Viewing Best Codes. Best Codes are selected by an algorithm that identifies the best codes to play.
During processing, a counter indicates the progression of the codes to be processed.
Playing the Best Codes, in probabilistic terms, reduces the number of attempts to guess the secret code.
If the Best Codes are marked with an asterisk, they are of an inconsistent type, that is, they will not be able to guess the secret code at the time they are played but still offer a better chance of reaching the secret code with a smaller number of attempts than choosing an attempt code among fit codes.
The top right shows the total of the Best Codes and how many of them have been displayed.
To navigate between Best Codes and make the selection, the modes are the same as for Fit Codes



How the "Best Codes" algorithm works

Let's begin to understand how Fit Codes are identified by assuming that the program plays as a decoder.
1) At the beginning the program generates all the 1296 codes it keeps in memory. At this stage these codes are all Fit Codes.
2) On the first play the program selects a Fit Code randomly except for codes with a color repeated 3 or 4 times. Those are the worst codes to start with.

3) Compare your Attempt Code with each of the Fit Codes. Anyone who generates a Key Code other than the one obtained by the player is discarded.
4) The program plays one of the remaining Fit Codes.
5) The program repeats the procedure from step 3).

Now, given that each Fit Code has the same chance as the other Fit Codes to guess the Secret Code, in case you don't guess it, based on the Key Code received many or less Fit Codes will remain for the next attempt.
The objective of the algorithm is to keep, in probabilistic terms, the fewest number of Fit Codes.
Obviously, the luck component cannot be eliminated and retains a significant role.

First version of the algorithm

I developed this version in 1985. It is the "Simula" routine included in the old lists that I report in the images below. In the current program this routine has been improved.
A copy of the Fit Codes list is used as a list of possible Secret Codes.
For each Fit Code, a score is associated that is determined as follows: it is simulated to play the first Fit Code and it is assumed that the Secret Code is the first on its list. Based on the generated Key Code, all Fit Codes compatible with the Key Code are counted. The number obtained is added to the score of the first Fit Code.
This operation is repeated assuming that the secret code is the second from the list obtaining a new number to be added to the score of the first Fit Code.
Once all the Secret Codes have been completed, the second Fit Code is passed and the simulation for all the Secret Codes is repeated to obtain the score for the second Fit Code as well.
The above procedure is repeated for the remaining Fit Codes.
At the end, the Fit Codes with the lowest score will be chosen Best Codes.
If there are multiple Fit Codes with the same score, they will all be elected to Best Codes.
This algorithm guesses the Secret Code on average at 4.54 attempts. Result obtained from 1000 games played.

Enhanced version

A copy of the Fit Codes list is made and this is considered the list of Possible Secret Codes.
Now it is simulated to play the first Fit Code in the list and that the Secret Code is the first in the respective list. In this case, since the two codes are identical, the Key Code will be 4 blacks (=4 neri, N.ed.).
For each Fit Code, a table is defined in advance as the one in the figure below that contains all the possible Key Codes and each box is set to zero.

	0 Neri	1 Nero	2 Neri	3 Neri	4 neri
0 Bianchi	0	0	0	0	0
1 Bianco	0	0	0		
2 Bianchi	0	0	0		
3 Bianchi	0	0			
4 Bianchi	0				

In this case, the "4 blacks" box will be increased by one. The operation is repeated by keeping the first Fit Code fixed and switching to the second Secret Code.
Also here, based on the Key Code obtained, the corresponding box will be increased.
The process is repeated for all Secret Codes.

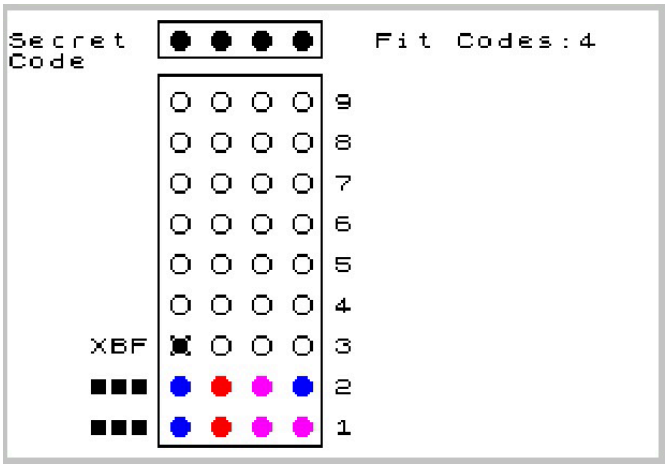
When finished, the values in the boxes will indicate the number of Fit Codes that would remain if the first Fit Code were played and the Key Code was the one for the box itself. For example, if box 2 Blacks and 2 Whites (=2 Bianchi, N.ed.) contains 3, it means that if you play the first Fit Code and receive 2 Black and 2 White as the Key Code, the remaining Fit Codes for the next play will be 3. (Obviously if the secret code is not guessed)
At this point, the algorithm associates the maximum value (MAX) found in the table with the first Fit Code.
MAX is therefore the maximum number of Fit Codes that can remain if the first Fit Code is played.
The algorithm now repeats the same process for the next Fit Code, obtaining its MAX.
Keep it up until the end of all Fit Codes.
All Fit Codes will now be checked. The one that will have the lowest MAX value, will be elected Best Code.
If other Fit Codes have the same MAX, these will also be Best Codes.

The basis for processing Fit Codes can be extended to all codes (1296) by competing Fit Codes with inconsistent codes, (codes that cannot be the secret code). Well, sometimes inconsistent codes have a lesser MAX than that obtained by Fit Codes, and therefore can be played leaving a smaller number of Fit Codes for the next attempt.
If part of the Fit Codes and some inconsistent codes receive the same value as MAX, only the former will be elected to Best Codes as they also have the ability to guess the secret code.
As the processing time increases based on the number of processed codes, the use of the algorithm should be limited to avoid excessive waiting times that may bore the player.
If the program is a decoder, the algorithm is executed if the fit codes are less than or equal to 317.

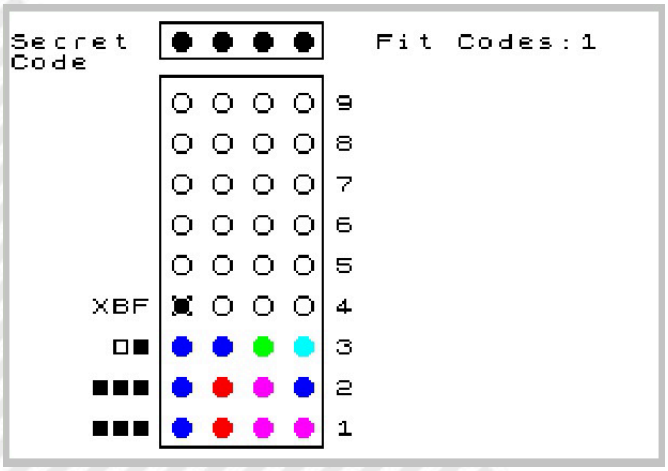
If the fit codes are less than or equal to 50, the algorithm considers all 1296 codes for processing.
Same mode as above when the player is the decoder and selects option “B”.
By choosing a code that is not a color repeated 4 times as the first attempt, a maximum of 317 Fit Codes remain and therefore, unless the case is above, on the second attempt the algorithm can be executed.
When the number of Fit Codes decreases in subsequent attempts, 50 will be a good compromise to extend the use of the algorithm to all 1296 codes with the possibility of having inconsistent codes as Best Codes.

Example of using inconsistent code

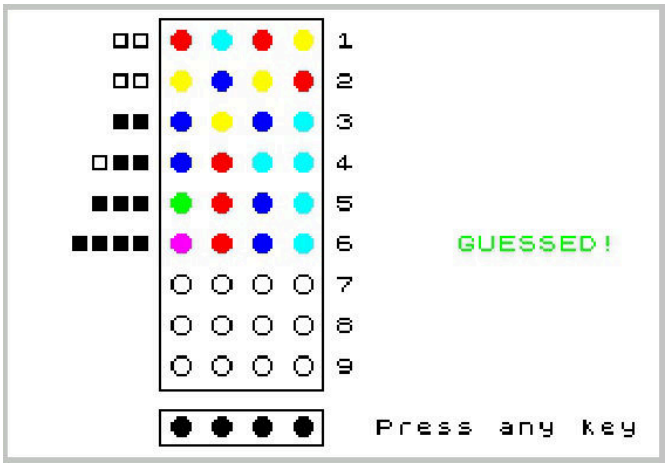
Assume that you have reached this game situation:



It does not seem bad, 3 blacks on the first attempt and also on the second that confirm that the first 3 colors are right and also in the right place. At this point just repeat the code by changing the last color with one of the 4 possible. By doing so, however, you have a 25% chance of guessing the secret code on the third attempt, and if you're unlucky, you'll guess it on the sixth attempt.
If you play an inconsistent code like the one in the figure below:



You'll be sure to guess the secret code on the fourth try. On the fifth try, if in the same situation the first code played are 4 different colors.
How many attempts does the program need to guess the secret code?
At most 5. The average is 4.47. The program could do better, but the waiting times for the elaboration of the codes would be extended as explained above. In rare cases and only if the initial attempt is of type 1123, that is with a single repeated color, it may take 6 attempts as in the example below.



The initial attempts of type 1112 and 1111, are those that imply a greater risk of getting to guess the secret code on the sixth attempt or later and therefore are never played by the program.

"ZX Master Mind", a brief history of how it went

In the 80’s, microcomputers such as ZX Spectrum and Commodore 64, gave my generation the ability to have a computer at home without spending large amounts of money and being able to learn how to program, although the great spread of this type of computer was more related to the possibility of using it as a console for games. Games that could be purchased in original or found in audio cassettes attached to magazines purchased at newsstands. I started writing the Master Mind program in 1985 when I was a high school student in Computer Science. I found it challenging to implement in the programs the logic of games such as BattleShip, Force 4 and Tetris. I wrote the part about the logic of games, the one that gave me the most satisfaction, but then I lost interest and the games remained incomplete.

Master Mind was the one that I worked for the longest because of the goal of making a program that could play better than a good human player, I really liked it.
From this I would have tried to learn the best game strategies to become better or better among friends. :-).
I didn't know how far I could go, but I soon realized that it wouldn't be easy to pursue my goal. The code developed

in Basic was too slow for the elaborations I had in mind and so the calculation part had to be converted to Assembler.
Another challenge was memory management, I had to be able to keep the program in basic memory, the source in assembler and the compiled one, two assemblers: Zeus, which I used to write the assembler and Champ, for the instruction debugging phase and finally the 1296 combinations that occupied about 13K.

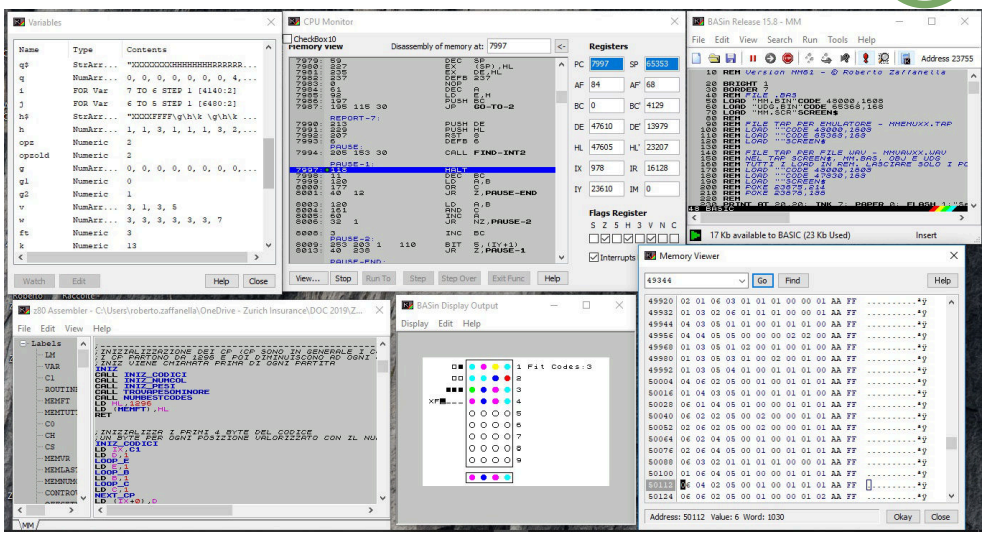


Fig. 1 - BasIn running

In the end, the “core” of the program, which were then routines in Assembler, were there. But as with other programs, it remained incomplete.

Since then I have done nothing and the only times that the Spectrum has happened to my hands, it was to move it from cellars to attics.
"Sooner or later I'd like to turn it on and do something about it," was the thought when I saw it. Then finally a while ago the right time came while I was cleaning up old paperwork, I found the old listings of programs including those of the assembler routines of the Master Mind. I was hoping to start again from the program I had left, but turning on my Spectrum I immediately realized that he had problems and so I had to give up.
Then I decided to find a Speccy emulator on PC, to rewrite the program starting from the base of the found lists. The rust was very much and it took me a long time to regain confidence with the Assembler and to understand the logic of the routines I had written. Retracing the reasoning made 35 years earlier was as exciting as reviewing the photos of those times.
Then I tried to recreate the environment I had on the Spectrum but this time with the emulator FUSE and Zeus Assembler + CHAMP in TZX version; Zeus for programming and CHAMP for debugging.
After a while I realized that this way of proceeding was too laborious and slow and so I tried, and fortunately found, an IDE (Integrated Development Environment) to be used on Windows PC called "BASIN".

The rest is a recent story of many nights spent writing and above all rewriting, improving, speeding up the code and keeping it all in the 48K.
Thank you very much to the authors of BasIn. Without this tool I think it would not have been possible for me to finish the project. I would highly recommend it to those who want to develop both Basic and Assembler.
In this case, however, I recommend version 15.8. I have encountered problems with later versions.
Here is the download link: https://sites.google.com/site/ulaplus/home/zx-spin-and-basin 15.8

It unzips into a folder and does not need to be installed. You can see the lists in Basic and Assembler, the running program, the value of the variables, the memory content and the execution of the object code (Fig. 1).

One last note on the choice of using English for menus and other parts of the program.
The video space of the Spectrum is very limited compared to what we have been used to for some time and English is well suited to saving video space. In addition, the program can be used by non-Italian people more easily.

Questions, bug reports or suggestions are welcome. Write to zaffaroby@gmail.com

When Roberto proposed to us his version of Master Mind for Zx Spectrum, we immediately thought it was a great idea publishing his contribution.

We would have liked to publish the listings as well, but they were actually too long and publishing just a part would have not done justice to Roberto’s great work.

Program and its listings may be downloaded from here:
https://sourceforge.net/p/zx-master-mind/activity/?page=0&limit=100#5ea36164f0d34732a6bdd66e

Conversion of a number from binary to digital

by Gianluca Girelli

The conversion of numbers in the various formats (binary, decimal, hexadecimal, etc.) is one of the problems that retro-coders often face, not only when trying out the Machine Language, but also when simply consulting the memory maps of the systems concerned. Usually, however, although obviously the computer "understands" only series of binary numbers (in base 2), the programmer works in decimal or in hexadecimal (base 16) since the decimal system is more easily intelligible for the human being, while the hexadecimal allows to "compact" the numerical sequences with which one works. For example, the decimal number "255" corresponds to the hexadecimal sequence "FF", while "65535" corresponds to "FFFF", with a clear saving of characters needed to represent the number. Furthermore, even if the explanation goes beyond the purpose of this paper, it is possible to perform operations on a four-digit hexadecimal number by breaking it down into pairs of two that can represent, if we were talking about memory locations, the "low byte" and the "high byte" of the memory address to which we want to operate.

There are times when, as I will illustrate below, it is necessary to work with binary numbers even if the relative sequences are much longer to manipulate (the decimal number "255" corresponds to "11111111" in the binary system). Generally BASIC languages have in their instruction set commands that transform numbers from base 10 to base 16 (HEX$) or vice versa (DEC); I have never found, however, instructions that allow you to work easily on base 2.

On these pages more than once, starting from the now historical "Number 1", we have faced the problem of reprogramming the fonts to add new fonts to the basic system. For example, we have repeatedly cited and implemented the Amstrad "Future Character Set". Recently I came across the "Katakana font" which was included in the VIC-1001 [fig. 1], homologous to the VIC-20 but marketed only in Japan. I then went in search of the data for character redefinition and found a description of them by means of binary strings [fig. 2]. The problem I faced was therefore to translate these strings into the corresponding decimal value so that I could then load the data into the redefinition program already seen previously. To avoid getting crazy in transforming every single sequence by hand (about 50 characters for 8 sequences per character equals at least 400

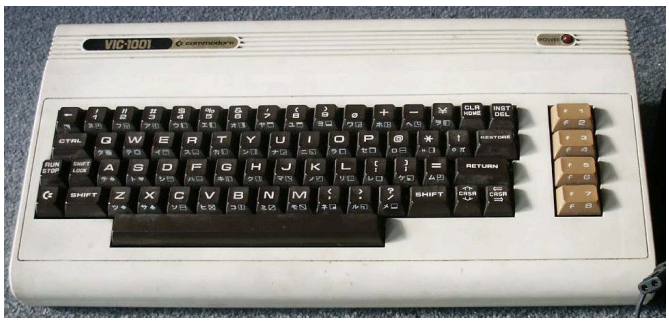


Fig. 1 - The VIC-1001

transformations..) I wrote an algorithm to automate it all. Let's see how.

First of all, I started from the theory, which I briefly report for the benefit of the most rusty reader. Numerical systems are "positional" systems, that is, systems in which the symbols (digits) used to write the numbers take different values depending on the position they occupy in the notation. In the decimal system the first digit from the right expresses the number of units, the second the number of tens, the third the number of hundreds, the fourth the number of thousands, and so on. The value of the number is then given by the sum of the digits that compose it multiplied by the base (for example 10) raised to the number corresponding to the position occupied.
Therefore:
255=2*10^2+5*10^1+5*10^0; FF=15*16^1+15*16^0.

For ease of writing the code, deliberately not optimized to make it as understandable as possible, I assumed that the input binary strings were always eight digits. The algorithm works by reading a string and, after checking its length, calculates its value as described above. To speed up the execution of the program a little, the validity check of the characters entered (only "0" or "1") is done as the string is processed. If the string contains only zeros, its decimal value (0) is directly assigned to the variable "c%"

```
10 rem binary to decimal conversion v2
26 b$=""
28 c%=0
30 input"insert 8-digit binary string";b$
40 if len(b$)>8 then print"string too long":goto 30
50 if len(b$)=0 then b$="00000000":goto 100
60 for i=8 to 1 step -1
70 :  if (mid$(b$,i,1)<>"0" and mid$(b$,i,1)<>"1")
```

PETSCII Katakana Characters
VIC-1001 character ROM 2: (screen) codes 41–7F; Unicode range U+30A0 – U+30FF *("Katakana")* and U+5E74, U+6708, U+65E5 (date: year, month, day).
Codes for halfwidth Katakana letters, Unicode range U+FF00 – U+FFEF *("Halfwidth and Fullwidth Forms")*, are provided in parentheses.

(Wherever there is both a small and a big variant for a glyph, the big form was chosen as the Unicode reference.)

```
2-41: U+30C1 (U+FF81) "TI"  チ (ﾁ)
......X.
..XXXX..
....X...
.XXXXXX.
....X...
....X...
...X....
........

2-42: U+30C4 (U+FF82) "TU"  ツ (ﾂ)
........
.X.X..X.
.X.X..X.
......X.
......X.
.....X..
...XX...
........

2-43: U+30C6 (U+FF83) "TE"  テ (ﾃ)
..XXXX..
........
```

Fig. 2 - Binary sequences katakana characters

```
then print"invalid string":goto 30
82 :  c%=c%+val(mid$(b$,i,1))*2^(8-i)
90 next
96 print c%
100 end
```

Once I consolidated the code to convert a binary string to a decimal number, I moved on to the second part of the problem: use the algorithm to convert the sequences that made up the VIC-1001 katakana into "character data". Since as we know each character of text is defined by an 8x8 point array, corresponding to a sequence of 8 bytes, I inserted the conversion instructions into a FOR-NEXT loop that, by reading the input sequences, would store them in an array for future use. To check the actual operation, I began by checking the goodness of the data for the characters "TI", "TSU", "TE" and "TO": as they are calculated, the values are entered in the graphic memory of the C128 to check the goodness of the result [fig. 3].

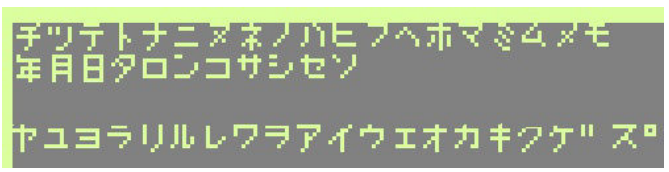


Fig. 3 - Katakana on graphic screen

```
10 graphic 1,1
20 dim a%(7):rem 8 elements, from 0 to 7
25 for i=0 to 7:a$(i)="0":next
26 b$=""
28 c%=0
50 for j=1 to 32
55 :  read b$
60 :  for i=8 to 1 step -1
80 :    a%(i-1)=val(mid$(b$,i,1))
85 :  next i
86 :  for i=0 to 7:print a%(i):c%=c%+a%(i)*2^(7-
i):next:rem power elevation
87 :  print:print c%:print:print
88 :  poke 8191+j,c%
89 :  c%=0
90 next j
400 rem "TI"
402 data
00000010,00111100,00001000,01111110,00001000,00001
000,00010000,00000000
404 rem "TSU"
406 data
00000000,01010010,01010010,00000010,00000010,00000
100,00011000,00000000
408 rem "TE"
410 data
00111100,00000000,01111110,00001000,00001000,00001
000,00010000,00000000
412 rem "TO"
414 data
00010000,00010000,00010000,00011000,00010100,00010
000,00010000,00000000
```

At this point, what is missing in the program is simply the code to save the result to mass storage for future use. I

leave it to the willing reader to write that portion of the code, meaning that I can still be reached via RMW's official social media platforms for any help. However, here is the data of the entire katakana set. Goodbye on the next issue.

```
416 rem "NA"
418 data
00001000,00001000,01111110,00001000,00001000,00010
000,00100000,00000000
420 rem "NI"
422 data
00000000,00111100,00000000,00000000,00000000,01111
110,00000000,00000000
424 rem "NU"
426 data
00111110,00000010,00010100,00001000,00010100,00100
000,00000000,00000000
428 rem "NE"
430 data
00001000,00111110,00000100,00001000,00011100,00101
010,00001000,00000000
432 rem "NO"
434 data
00000100,00000100,00000100,00001000,00010000,00100
000,00000000,00000000
436 rem "HA"
438 data
00001000,00100100,00100010,00100010,00100010,01000
010,00000000,00000000
440 rem "HI"
442 data
01000000,01000000,01111100,01000000,01000000,00111
110,00000000,00000000
444 rem "HU"
446 data
00111110,00000010,00000010,00000100,00001000,00010
000,00000000,00000000
448 rem "HE"
450 data
00000000,00010000,00101000,01000100,00000010,00000
010,00000000,00000000
452 rem "HO"
454 data
00001000,01111110,00001000,00101010,00101010,01001
010,00001000,00000000
456 rem "MA"
458 data
01111110,00000010,00100100,00011000,00001000,00000
100,00000000,00000000
460 rem "MI"
462 data
00011000,00000100,00010010,00001000,00100100,00010
000,00001100,00000000
464 rem "MU"
468 data
00001000,00010000,00100100,01000100,01111100,00000
010,00000000,00000000
470 rem "ME"
472 data
00000010,00000010,00010100,00001000,00010100,00100
000,00000000,00000000
474 rem "MO"
476 data
00111100,00010000,01111110,00010000,00010000,00001
110,00000000,00000000
478 rem "YA"
480 data
00010000,01111110,00010010,00010100,00010000,00010
000,00010000,00000000
482 rem "YU"
484 data
00000000,00111100,00000100,00000100,00000100,01111
110,00000000,00000000
486 rem "YO"
488 data
00000000,01111110,00000010,00111110,00000010,01111
110,00000000,00000000
490 rem "RA"
492 data
00111100,00000000,01111110,00000010,00000100,00001
000,00000000,00000000
494 rem "RI"
496 data
00100010,00100010,00100010,00100010,00100010,00000
100,00001000,00000000
498 rem "RU"
500 data
00101000,00101000,00101000,00101010,00101010,01001
100,00000000,00000000
502 rem "RE"
504 data
00100000,00100000,00100000,00100010,00100100,00111
000,00000000,00000000
506 rem "WA"
508 data
01111110,01000010,01000010,00000100,00001000,00010
000,00000000,00000000
510 rem "WO"
512 data
01111110,00000010,01111110,00000010,00000100,00001
000,00000000,00000000
514 rem "A"
```

```
516 data
01111110,00000010,00010100,00011000,00010000,00010
000,00100000,00000000
518 rem "I"
520 data
00000010,00001100,00011000,00101000,01001000,00001
000,00001000,00000000
522 rem "U"
524 data
00010000,01111110,01000010,00000010,00000100,00001
000,00000000,00000000
526 rem "E"
528 data
00000000,00111110,00001000,00001000,00001000,00111
110,00000000,00000000
530 rem "O"
532 data
00001000,01111110,00001000,00011000,00101000,01001
000,00001000,00000000
534 rem "KA"
536 data
00010000,01111110,00010010,00010010,00100010,01000
110,00000000,00000000
538 rem "KI"
540 data
00001000,00111110,00001000,00111110,00001000,00001
000,00001000,00000000
542 rem "KU"
544 data
00011110,00100010,01000010,00000100,00001000,00010
000,00100000,00000000
546 rem "KE"
548 data
00100000,00111110,01001000,00001000,00001000,00010
000,00100000,00000000
550 rem "VOICED SOUND MARK apex"
552 data
01010000,01010000,01010000,00000000,00000000,00000
000,00000000,00000000
554 rem "SU"
556 data
01111110,00000100,00001000,00011000,00100100,01000
010,00000000,00000000
558 rem "SEMI-VOICED SOUND MARK point"
560 data
01110000,01010000,01110000,00000000,00000000,00000
000,00000000,00000000
562 rem "YEAR, PERSON'S AGE"
564 data
01000000,01111110,00001000,00111110,00101000,01111
110,00001000,00000000
566 rem "MONTH"
568 data
00111110,00100010,00111110,00100010,00111110,00100
010,00100010,00000000
570 rem "DAY, DAYTIME"
572 data
00111110,00100010,00100010,00111110,00100010,00100
010,00111110,00000000
574 rem "TA"
576 data
00011110,00100010,01010010,00001100,00001000,00010
000,00100000,00000000
578 rem "RO"
580 data
00000000,01111110,01000010,01000010,01000010,01111
110,00000000,00000000
582 rem "N"
584 data
01100000,00000000,00000010,00000010,00000100,01111
000,00000000,00000000
586 rem "KO"
588 data
00000000,01111110,00000010,00000010,00000010,01111
110,00000000,00000000
590 rem "SA"
592 data
00100100,01111110,00100100,00100100,00000100,00001
000,00000000,00000000
594 rem "SI"
596 data
01100000,00000000,01100010,00000010,00000100,01111
000,00000000,00000000
598 rem "SE"
600 data
00100000,01111110,00100010,00100100,00100000,00011
110,00000000,00000000
602 rem "SO"
604 data
01000010,00100010,00000010,00000100,00001000,00010
000,00000000,00000000
```

Useful links

https://en.wikipedia.org/wiki/Positional_notation

https://www.masswerk.at/misc/vic-1001-kana.html

BASIC fractals in 8-bit sauce

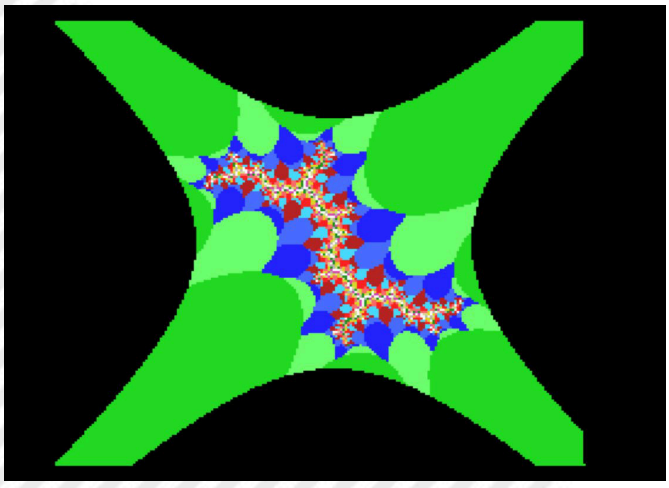
by David La Monaca

Almost every successful 8- and 16-bit home computer offered its users BASIC as the default programming language and it was often integrated into the operating system. The several “dialects” of BASIC were often written and implemented by Microsoft for the many brands that were entering the world market, but with some exceptions (e.g. Atari Basic, Sinclair’s ZX Basic, Amstrad’s Locomotive Basic, Acorn BBC Basic to name a few). Most of these implementations featured a subset of special commands designed to create and manage high-resolution graphics in order to exploit the computer’s custom hardware features. To start exploring the potential of the graphic functions available in many 8-bit machines, we propose in these pages some short, simple listings that create classic fractal images. We invite you to test them out on your real home computers or emulators, with a small warning: despite the relative efficiency of the graphic statements included in the individual computers’ BASIC, the computing and plotting times of the fractal figures are far from being fast and nearly all of the programs, once given the RUN command, require hours of processing to complete the drawings.

So, are you all ready? Hands on your keyboards and enjoy typing! It could be a great way for you to get back to the old days when you used to spend whole afternoons typing games and programs from your favourite books and magazines.

1. MSX2 BASIC - JULIA

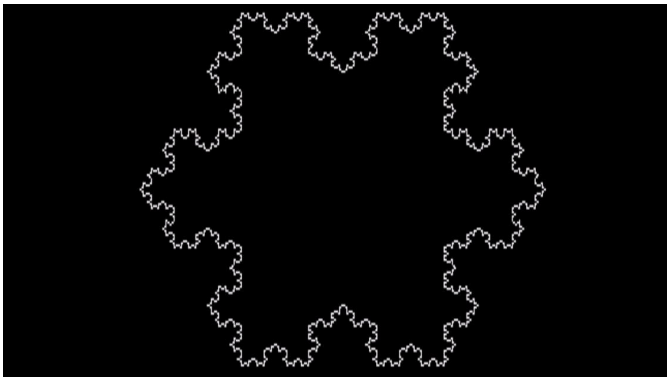
Julia set for $f(z) = z^2 + i$
MSX-2 (Z80, 1985)



```
10 SCREEN 5:COLOR ,0,0;CLS
20 FOR I=-120 TO 120
30 FOR J=-100 TO 100
40 ZRE=I/40:ZIM=J/40:K=0
50 TMP=ZRE*ZRE-ZIM*ZIM
60 ZIM=2*ZRE*ZIM+1
70 ZRE=TMP:K=K+1
80 IF ABS(ZRE)<2 AND K<15 THEN 50
90 PSET(127+I,105-J),K
100 NEXT
110 NEXT
120 GOTO 120
```

2. BBC BASIC - KOCH SNOWFLAKE

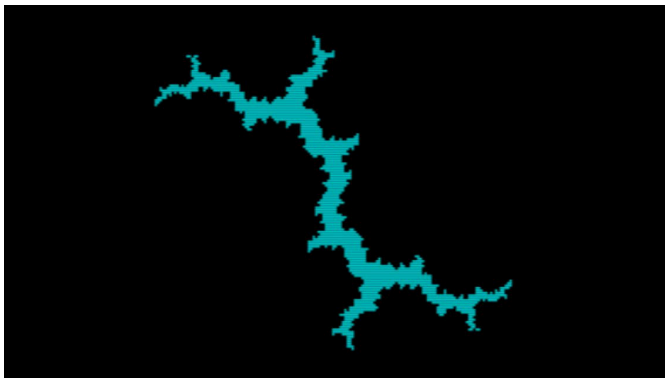
The Koch snowflake
BBC Model B Microcomputer (6502, 1981)



```
10 MODE 0
20 X=459:Y=851:A=0
30 MOVE X,Y
40 FOR I%=1 TO 3
50 A=A+2*PI/3
60 PROCKOCH(680)
70 NEXT
80 END
90 DEF PROCKOCH(L)
100 IF L<=24 THEN PROCFD(L) ELSE PROCKOCH(L/
3):A=A-PI/3:PROCKOCH(L/3):A=A+2*PI/
3:PROCKOCH(L/3):A=A-PI/3:PROCKOCH(L/3)
110 ENDPROC
120 DEF PROCFD(L)
130 X=X+L*SIN(A):Y=Y+L*COS(A)
140 DRAW X,Y
150 ENDPROC
```

3. ZX BASIC - JULIA

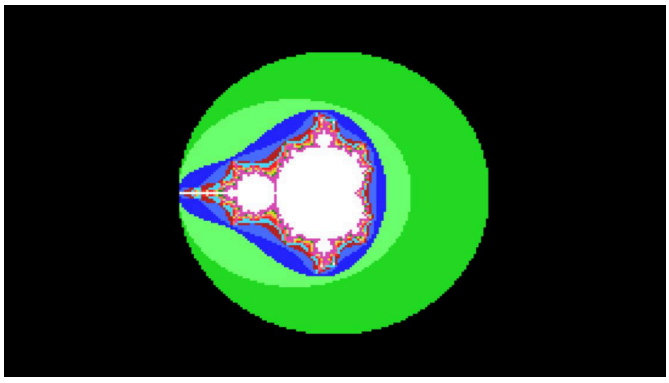
Julia set for f(z) = z^2 + i
Sinclair ZX Spectrum (Z80, 1982)



```
10 PAPER 0: BORDER 0: INK 5: CLS
20 FOR i=-75 TO 75
30 FOR j=-75 TO 75
40 PLOT 127+i,85+j
50 LET zre=i/56: LET zim=j/56
60 LET k=0
70 LET temp=zre*zre-zim*zim
80 LET zim=2*zre*zim+1
90 LET zre=temp: LET k=k+1
100 IF ABS zre<2 AND k<9 THEN GO TO 70
110 IF k<9 THEN PLOT INVERSE 1; 127+i,85+j
120 NEXT j
130 NEXT i
```

4. MSX2 BASIC - MANDELBROT

The classic set of Mandelbrot or "the spaceship"
MSX-2 (Z80, 1985)



```
10 SCREEN 5:COLOR ,0,0:CLS
20 FOR I=58 TO 197
30 FOR J=30 TO 169
40 X=(I-127)/32:Y=(J-99)/32
50 RE=0:IM=0:K=0
60 TMP=RE*RE-IM*IM+X
70 IM=2*RE*IM+Y
80 RE=TMP
90 K=K+1
100 IF RE*RE+IM*IM<4 AND K<200 THEN 60
110 IF K=200 THEN C=15:GOTO 140
120 IF K>=13 THEN C=13:GOTO 140
130 C=K
140 PSET(I,J),C
150 NEXT J
160 NEXT I
170 GOTO 170
```

5. MSX2 BASIC - BARNSLEY'S FERN

The Barnsley's fern
MSX-2 (Z80, 1985)

```
10 SCREEN 5:COLOR ,0,0:CLS
20 X=0:Y=0
30 FOR I=-30000 TO 30000
40 R=RND(1)
50 IF R<.01 THEN X=0:Y=.16*Y:C=11:GOTO 90
60 IF R<.86 THEN T=.85*X+.04*Y:Y=-.04*X+.
85*Y+1.6:X=T:C=12:GOTO 90
70 IF R<.93 THEN T=.2*X-.26*Y:Y=.23*X+.
22*Y+1.6:X=T:C=2:GOTO 90
80  T=-.15*X+.28*Y:Y=.26*X+.24*Y+.44:X=T:C=3
90 PSET(25*Y,105-25*X),C
100 NEXT I
110 GOTO 110
```

That's all for now, even if we have more listings ready to show you. Why? Because we want to receive your contributions and comments.

What are you waiting for? Send us your listings to the mailbox: **retromagazine.redazione@gmail.com** and we will publish them in the next issues.

Amiga, Commodore 64 and MS-DOS... shake hands!

by Francesco Fiorentini

What do have in common a hand, the Amiga, the Commodore 64 and the MS-DOS? If you can't answer this question, read this article in which I will try to demonstrate how, with a little imagination and the help of the Net, it is possible to create a virtual bridge between all these items.

This article is freely inspired by a series of posts that have followed each other recently in some Facebook groups and wants to be a demonstration of how, by interacting and collaborating together, we can have a lot of fun and at the same time learn something new.

But let's start from the beginning...
Which isn't really the beginning, but we'll find out later.

The Hand of the Amiga

Towards the end of September, a post by **Carlo Santagostino** caught my attention and that of many other users. Carlo in fact published a really interesting curiosity, such as those of the series "not everyone knows that". The famous startup screen that all those who used a Commodore Amiga have imprinted in their long-term memory, the hand that holds the floppy, was not a bitmap image, but was drawn in vectorial format to save space in the Kickstart ROM. Storing this image as points and lines to draw saved 3 Kb compared to bitmap storage. To see how this is done using vector graphics, someone implemented the hand drawing routine in AMOS BASIC retrieving data from ROM.

This post immediately generated a discreet hype around the news. The fact that **Andrea Sole** replied immediately after with a link where it was possible to find the vector coordinates and the algorithm to use them, contributed even more to the success of this news.

At the link published by Andrea (which you can find at the bottom of the article), vector data are provided, they are only 412 bytes, useful to draw the image (shown here for the convenience of readers):

FF 01 23 0B 3A 0B 3A 21 71 21 71 0B 7D 0B 88 16 88 5E 7F 5E 7F 38 40 383E 36 35 36 34 38 2D 38 2D 41 23 48 23 0B FE 02 25 45 FF 01 21 48 21 0A 7E 0A 8A 16 8A 5F 56 5F 56 64 52 6C 4E 71 4A 74 44 7D 3C 81 3C 8C 0A 8C 0A 6D 09 6D 09 51 0D 4B 14 45 15 41 19 3A 1E 37 21 36 21 36 1E 38 1A 3A 16 41 15 45 0E 4B 0A 51 0A 6C 0B 6D 0B 8B 28 8B 28 76 30 76 34 72 34 5F 32 5C 32 52 41 45 41 39 3E 37 3B 37 3E 3A 3E 41 3D 42 36 42 33 3F 2A 46 1E 4C 12 55 12 54 1E 4B 1A 4A 17 47 1A 49 1E 4A 21 48 FF 01 32 3D 34 36 3C 37 3D 3A 3D 41 36 41 32 3D FF 01 33 5C 33 52 42 45 42 39 7D 39 7D 5E 34 5E 33 5A FF 01 3C 0B 6F 0B 6F 20 3C 20 3C 0B FF 01 60 0E 6B 0E 6B 1C 60 1C 60 0E FE 03 3E 1F FF 01 62 0F 69 0F 69 1B 62 1B 62 0F FE 02 63 1A FF 01 2F 39 32 39 32 3B 2F 3F 2F 39 FF 01 29 8B 29 77 30 77 35 72 35 69 39 6B 41 6B 41 6D 45 72 49 72 49 74 43 7D 3B 80 3B 8B 29 8B FF 01 35 5F 35 64 3A 61 35 5F FF 01 39 62 35 64 35 5F 4A 5F 40 69 3F 69 41 67 3C 62 39 62 FF 01 4E 5F 55 5F 55 64 51 6C 4E 70 49 71 46 71 43 6D 43 6A 4E 5F FF 01 44 6A 44 6D 46 70 48 70 4C 6F 4D 6C 49 69 44 6A FF 01 36 68 3E 6A 40 67 3C 63 39 63 36 65 36 68 FF 01 7E 0B 89 16 89 5E FE 01 22 0B FE 01 3B 0B FE 01 61 0F FE 01 6A 1B FE 01 70 0F FE 01 7E 5E FE 01 4B 60 FE 01 2E 39 FF FF

and the algorithm for using them:

1 - Read two bytes at a time.
2 - If both bytes are FF, terminate the program.
3 - If the first byte is FF and the second byte is not, start drawing a polyline with the color index indicated in the second byte. Consider the next two bytes as x,y coordinates belonging to the polyline, except if the first byte is FF (see rules 2 and 3) or FE (see rule 4), which is where the line drawing stops.-
4 - If the first byte is FE, an area is filled using the color index given in the second byte, starting from the point whose coordinates are indicated in the next two bytes.

The palette to be used is as follows:
0: #fff
1: #000
2: #77c
3: #bbb
The offsets used to draw the centered image are X=70, Y=40.

Reproducing the drawing

At this point I think that many came up with the idea of trying to draw the famous hand of the Amiga starting from the information stored in ROM, but the fastest one to realize the work was **Francesco Sblendorio**.
In fact, Francesco published a post on the Commodore Amiga international group, where he demonstrated how he had managed to replicate the design on a Commodore 16 using its Basic 3.5, with accompanying code:
https://www.facebook.com/groups/Amiga/posts/10158567665659157/

What happened in the next few hours was really fun. A kind of competition broke out to 'bring' the code to any platform, using retro-languages that were increasingly esoteric...

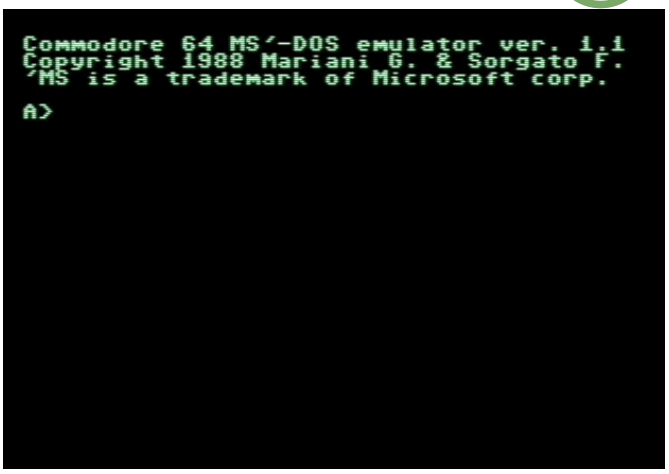
Obviously I did not want to be outdone and, aware of having rediscovered a BASIC extension of the Commodore 64 a few days before, called GW-Basic Simulator, I thought it would be interesting to make such a porting to create a kind of temporal bridge between the Commodore 64, the Amiga and the MS-DOS. That's the real starting point, but I still didn't know...

MS-DOS Emulator and GW-Basic Simulator

In 1987 the Systems Editorial of Milan put on the market two interesting packages for the owners of Commodore 64. These two software, made by G. Mariani and F. Sorgato, were nothing more than an emulator and simulator that allowed the home user of the 8-bit house Commodore, to become familiar, at little expense, with the controls of the new operating system of professional computing. Obviously both softwares suffered from the inherent limitations of the Commodore 64 and their functionality was reduced compared to the software they wanted to emulate. Translated: they do little, but the little they do, they do it well.

The MS-DOS Emulator

The MS-DOS emulator is nothing more than an implementation of COMMAND.COM with some additional commands from the Microsoft OS.
The commands included in the COMMAND.COM file are



the followings: BREAK, CHDIR or CD, CLS, COPY WITH, COPY, DATE, DEL or ERASE, DIR, echo, FORMAT, MKDIR or MD, PATH, PAUSE, PRINT, PROMPT, REM, RENAME or REN, RMDIR or RD, SIZE, sys, TIME, TYPE, true, VERIFY, VOL.

In addition to these, the following external commands have also been implemented: CHKDSK and DISKCOPY.

Let's see some of them together.

CLS - cleans the screen
DIR - this command does not need presentations, it shows the list of files and directories in the current directory. For each file, the size, date and time (current...) are also shown.

Copyright 1988 Mariani G. & Sorgato F.
'MS is a trademark of Microsoft corp.
A>dir
Volume in drive A is MASTER MSDOS2
Directory of A:/
COMMAND COM 24384 1-1-1980 0:11
AUTOEXEC OLD 254 1-1-1980 0:11
GWBASIC EXE 19558 1-1-1980 0:11
DISKCOPY COM 12700 1-1-1980 0:11
INTRO TXT 508 1-1-1980 0:11
CREADIR BAT 1016 1-1-1980 0:11
DIRALL EXE 254 1-1-1980 0:11
MORE EXE 508 1-1-1980 0:11
CHKDSK EXE 254 1-1-1980 0:11
PRINT1 EXE 508 1-1-1980 0:11
README TXT 762 1-1-1980 0:11
11 File(s) 98044 bytes free
A>

DATE - allows you to set the current date using the format: mm:dd:yyyy
TIME - allows you to set the current time using the format: hh:mm:ss
SIZE - returns the size in bytes of a program. Frankly I think it is useless since the same information is available with the command DIR...
PROMPT - allows you to change the standard DOS prompt. Your options are as follows: [free text] [$v] [$n] [$g] [$l] [$b] [$h] [$s] [$d]
[$v] - dos version
[$n] - current drive name

[$g] - greater symbol: >
[$l] - smaller symbol: <
[$b] - colon: :
[$h] - backspace
[$s] - space
[$d] - current date
Example: prompt RMWbn$g will produce as prompt: RMW:A>

SYS - transfers COMMAND.COM to the root of another floppy disk
TYPE - prints the contents of a file on screen

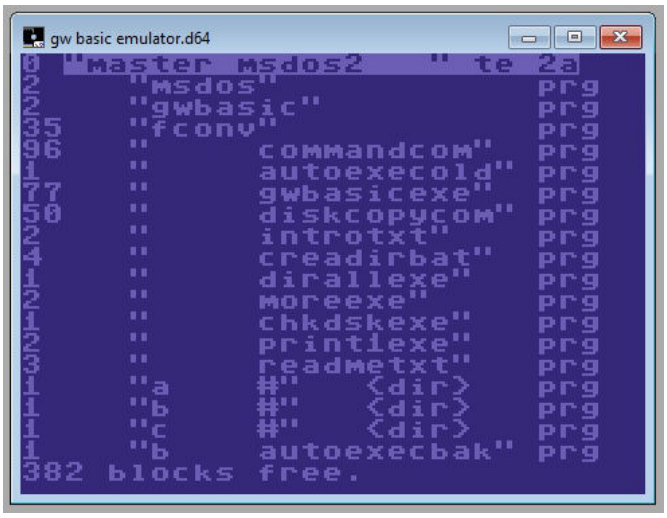
```
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>
RMW:A>type autoexec.bak

date
time
type readme.txt
pause
type intro.txt
pause
gwbasic

RMW:A>
```

The directories

Directories deserve a separate chapter. Although the Commodore 64 OS does not support the directory concept, it has been implemented in the MS-DOS Emulator. The software allows you to create and navigate in a deep directory tree up to 5 levels. Again, there are limitations: the directory name cannot be longer than one character.
MD - allows the creation of a new directory.
Example: MD C
CD - allows you to change the current directory
RD - deletes a directory. Example: RD C

```
MORE     EXE     508   11-01-2021   22:29
CHKDSK   EXE     254   11-01-2021   22:29
PRINT1   EXE     508   11-01-2021   22:29
README   TXT     762   11-01-2021   22:29
A          <DIR>       11-01-2021   22:29
B          <DIR>       11-01-2021   22:29
        13 File(s)     97536 bytes free

A>md c

A>cd a

A>dir

 Volume in drive A is MASTER MSDOS2
 Directory of  A:/a

.          <DIR>       11-01-2021   22:34
..         <DIR>       11-01-2021   22:34
         2 File(s)     97282 bytes free

A>
```

It is interesting to see how the directories were actually implemented by peering inside the original Commodore 64 disk. At this point it is easy to understand the reason for the limitation of 1 character per directory and the maximum of 5 levels... :-)



Having to express a judgment on this MS-DOS Emulator, I can only say that you can see the care with which it was made, even if a professional use was obviously out of the question: its usefulness was limited to the educational purpose. A springboard to reach the real MS-DOS world, trying to arrive prepared at the office, with little expense.

The GW-Basic Simulator

Different discourse instead for the GW-Basic Simulator. The limitations of the Basic of the Commodore 64 have accustomed us over time to the flourishing of different extensions of this language and this GW-Basic Simulator, if framed in this perspective, could definitely say its word. Even years later.

Being an extension of the Basic V2, it goes without saying that all the commands of the C64 Basic standard are fully functional. These commands are enriched by a large list of new instructions, if I have not counted badly there are 82 new commands... Obviously all this has a price, which is paid by the ram available to the user. Once the GW-Basic Simulator is loaded, only 23295 bytes will be available to the programmer.

I'm not going to list or describe all the commands, for

that you can refer to the manual, but some of them certainly deserve to be mentioned.

- Graphic commands

The Basic V2 is really poor in terms of graphic commands, while the GW-Basic makes life much easier for the programmer:

SCREEN n - switch from text mode (n=0) to graphic mode 320x200 (n<>0)

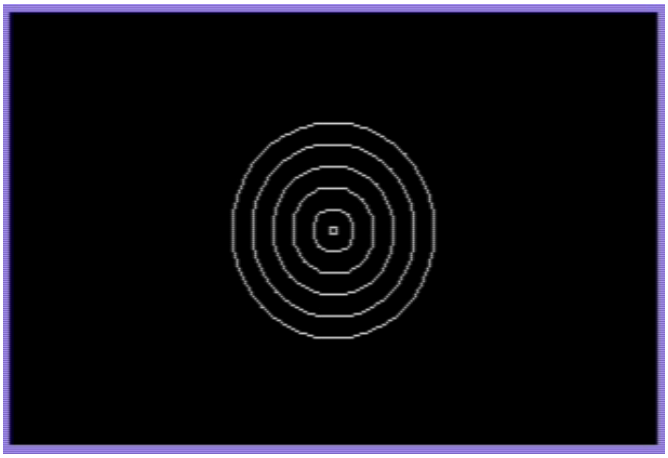
CIRCLE (x,y), radius [,color [,start, end [,appearance]]] - draw a circle starting from x,y with radius

CLS - cleans the screen (in text and graphics mode)

Background COLOR [,character [,border]] - change colors in canonical range (0-15)

```
10 screen1:color7.0:cls
20 circle(160,100),50
21 circle(160,100),40
22 circle(160,100), 30
23 circle(160,100),20
24 circle(160,100), 10
25 circle(160,100),2
30 i$=inkey$:if i$="" then 30
```

Output of the above program:



DRAW string - draw a figure

LINE [(x1,y1)]-(x2,y2)[,color[,B[F]]] - draw a line or rectangle

PAINT (x,y) - fills a figure with the current color. The coordinates must be inside the figure that you want to fill.

PSET (x,y) - draws a point at the specified coordinates

- Sound controls

SOUND frequency, duration - plays a note of the indicated frequency for the specified duration

PLAY string - allows you to play the melody specified in <string> using the musical notes according to the Anglo-Saxon notation and a series of commands to raise/lower the octaves, insert pauses, diesis...

- Statements

IF THEN ELSE - introduces the ELSE clause into the IF THEN Statement, absent in Basic V2.

WHILE...WEND - allows you to use up to 16 nested while... wends

- File management, strings and more...

The management of files and strings has also been greatly improved, implementing almost all the commands available to the GW-Basic of the MS-DOS while also maintaining its parameters.

For the moment I stop here, the list of commands is too long to be able to insert it in its entirety, however you can retrieve it from the manual that you can find on the Ready64 website at the link provided at the bottom of the article.

What about this product? It is certainly a valid extension of the Basic V2 that will be useful to many and a software that is less affected by the age and limitations that afflict the MS-DOS emulator.

Ehi.. Wait a minute... What about the Amiga's hand?

I almost forgot. Here is the code to draw the hand of the Amiga on a Commodore 64 using the GW-Basic Simulator. For convenience, since the GW-Basic Simulator lacks instructions to convert a number from hexadecimal to decimal, coordinates have already been translated into decimal values.

```
10 screen1:color7,0:cls:dr=0
20 reada,b
30 ifa=255andb=255then80
40 ifa=255andb<>255thendr=0:reada,b:goto60
50 ifa=254thendr=0:readc,d:pset(c,d):goto20
60 ifdr=0thendr=1:pset(a,b):goto70
65 ifdr<>0thenline-(a,b)
70 goto20
80 locate10,10:print"amiga":locate14,14:print"gwbasic on c64"
90 i$=inkey$:if i$="" then 90
100 data 255,1,35,11,58,11,58,33,113,33,113
101 data 11,125,11,136,22,136,94,127,94,127,56
110 data 64,56,62,54,53,54,52,56,45,56,45,65,35
111 data 72,35,11,254,2,37,69,255,1,33,72,33,10
120 data 126,10,138,22,138,95,86,95,86,100,82,108
121 data 78,113,74,116,68,125,60,129,60,140,10
130 data 140,10,109,9,109,9,81,13,75,20,69,21,65
131 data 25,58,30,55,33,54,33,54,30,56,26,58,22
140 data 65,21,69,14,75,10,81,10,108,11,109,11
141 data 139,40,139,40,118,48,118,52,114,52,95,50
150 data 92,50,82,65,69,65,57,62,55,59,55,62,58
```

```
151 data 62,65,61,66,54,66,51,63,42,70,30,76,18
160 data 85,18,84,30,75,26,74,23,71,26,73,30,74
161 data 33,72,255,1,50,61,52,54,60,55,61,58,61
170 data 65,54,65,50,61,255,1,51,92,51,82,66,69
171 data 66,57,125,57,125,94,52,94,51,90,255,1
180 data 60,11,111,11,111,32,60,32,60,11,255,1
181 data 96,14,107,14,107,28,96,28,96,14,254,3,62
190 data 31,255,1,98,15,105,15,105,27,98,27,98
191 data 15,254,2,99,26,255,1,47,57,50,57,50,59,47
200 data 63,47,57,255,1,41,139,41,119,48,119,53
201 data 114,53,105,57,107,65,107,65,109,69,114,73
210 data 114,73,116,67,125,59,128,59,139,41,139
211 data 255,1,53,95,53,100,58,97,53,95,255,1,57
220 data 98,53,100,53,95,74,95,64,105,63,105,65
221 data 103,60,98,57,98,255,1,78,95,85,95,85,100
230 data 81,108,78,112,73,113,70,113,67,109,67
231 data 106,78,95,255,1,68,106,68,109,70,112,72
240 data 112,76,111,77,108,73,105,68,106,255,1
241 data 54,104,62,106,64,103,60,99,57,99,54,101
250 data 54,104,255,1,126,11,137,22,137,94,254,1
251 data 34,11,254,1,59,11,254,1,97,15,254,1,106
260 data 27,254,1,112,15,254,1,126,94,254,1,75
261 data 96,254,1,46,57,255,255
```

Bonus listing - a gift!

Do you remember the article on graphs made in Visual Basic in RMW #9? Here are some of them realized with the GW-Basic simulator.

```
100 rem campionario of superfici nello spazio
110 screen 1:color 7,0:cls:s=20:ox=160:oy=100
120 th=.3:s1=sin(th):c1=cos(th):ph=.4:s2=sin(ph):c2=cos(ph)
130 rem loop principale
140 for q=1 to 9:gosub 290
150 rem meridiant
160 for y=-100 to 100 step s:fl=0:for x=-100 to 100 step s
170 rem on q gosub 340,350,360,370,380,390,400,410,420,430
171 on q gosub 340,350,370,380,390,400,410,420,430
180 gosub 270:if fl=0 then fl=1:pset (sx+ox,sy+oy)
190 line -(sx+ox,sy+oy):next x:next y
200 rem parallels
210 for x=-100 to 100 step s :fl=0:for y=-100 to 100 step s
220 on q gosub 340,350,370,380,390,400,410,420,430
230 gosub 270:if fl=0 then fl=1:pset (sx+ox,sy+oy)
240 line -(sx+ox,sy+oy):next y:next x:next q
250 gosub 440:end
260 rem-routine
270 rem da tridim. a bidim.
280 sx=x1*c1-y1*c2:sy=x1*s1+y1*s2+z1:return
290 rem pulizia schermo e tracciamento riferimenti
310 locate 2,5:print "done. press any key!":i$=inkey$:if i$="" then 310
320 cls
322 locate 2,2:print q:return
330 rem funzioni
340 x1=x/5:y1=y/5:z1=(1-cos(x1))*(1-cos(y1))-3:return
350 x1=x/6:y1=y/6:z1=.4*cos(x1*x1+y1*y1):return
360 rem: x1=x/4:y1=y/4:z1=exp(.02*(x1*x1+y1*y1))-3:return
370   x1=x/4:y1=y/4:z1=.02*((x1*y1*y1)-(y1*x1*x1)):return
380 x1=x/4:y1=y/4:z1=.02*((x1*y1*y1)+(y1*x1*x1)):return
390 x1=x/4:y1=y/4:z1=3*sin(x1/2)*sin(y1/3):return
400 x1=x/4:y1=y/4:k=(1-x1*x1/5-y1*y1/7):z1=sqr(2*k*(sgn(k)+1)):return
410 x1=x/6:y1=y/6:z1=.02*sqr(x*x*y*y/2)-3:return
420 x1=x/5:y1=y/5:z1=(1-sin(1.8*x1))*(1-cos(1.2*y1))-2:return
430 x1=x/5:y1=y/5:k=x1*x1+y1*y1:z1=.3*(1+cos(k))*(sgn(9.87-k)+1.):return
440 rem switch to mono
460 screen 0:return
```

Useful links:

MS-DOS Emulator and GW-Basic Simulator download and manual:
https://ready64.org/download/scheda_download.php?id_download=222

The link provided by Andrea Sole:
https://retrocomputing.stackexchange.com/questions/13897/why-was-the-kickstart-1-x-insert-floppy-graphic-so-bad

The importance of preserving software

by Alessandro Gatti

A few days ago, on October 14th, I came across this beautiful post written by Alessandro Gatti in the Commodore 64/128 Italia group. The message launched by Alessandro was too good to be quickly swallowed up by the frenetic activity of Facebook. So, with the permission of the author, I put forward the idea of publishing it in our magazine to increase its visibility and at the same time raise awareness among more and more people.
Francesco Fiorentini

Hello, everyone!
My name is Alessandro and it is the first time that I write in this group despite following it carefully and appreciating its contents.
Together with **Roberto Lanciotti** I am the man in the shadows behind the phantasmatic Dump Club 64: apart from jokes, we are two friends (one the opposite of the other), who share a passion for retrocomputing and who enjoy (each in their own way) tinkering with ribbons, floppy discs and uncalibrated or smeared cartridges.
Days ago, Roberto wanted to bring to your attention the tragic war bulletin of my battle of dumping with a mountain of Amiga diskettes.
It wasn't my first rodeo but unfortunately this time the final result wasn't very encouraging: only half of the disks were saved!
In reality they would have been even less if I had not struggled with my nails and teeth in trying to save them (all in fact were dumped at least 4-5 times, some of them even 10 times, before obtaining a copy without errors).
Many have undergone a file transplant (sometimes errors fortunately fell on libraries and directories common to other disks such as C, L, Libs, etc.) while others had the corrupted bootblock that I replaced.
Still others were cleaned with isopropyl alcohol until a valid copy was obtained! In short, it was a delusion between cleaning the discs, the drive head or tinkering with Opus directory in emulation with the WinUAE!
In one case I also found a disk without bootblock, libraries and startup-sequence: I took the opportunity to do a little licking by putting the writing of our group in ascii art in honor of the old days!
A chance to give life to a record that was never born!
Roberto Lanciotti told me that his post on the subject opened a discussion about it and asked me to tell my point of view!
I have always believed that preserving through dumping is essential.
Some estimates indicate that the duration of floppy disks is between 10 and 30 years although in reality no one knows exactly how long floppy disks can last.
There is no deadline: among the many variables there are the quality of the support, use, the method of conservation, environmental factors, sudden changes in temperature and humidity, molds and finally the deterioration of the support itself.
All these factors can contribute to irreparably delivering the data contained in the disks to a fatal destination. They were certainly not designed to last that long, and I believe that at the time no one had considered the idea that they would still be used after more than 30 years.
In the practice of transferring floppy disks to files, still many floppies can be read but the safety margin is still widely exceeded and it is clear that there is no longer much time to postpone their preservation: everyone should transfer the data of their floppies as soon as possible.
The decay of the media are not the only threats that afflict this great mass of data: many diskettes are thrown or destroyed without recognizing to all intents and purposes a cultural, artistic or ingenious value among human works.
If you think about it every book, publication, musical disc, film and artistic work is, as it should be, archived by national libraries all over the world while this same thing does not happen for the software for which no one seems to care to preserve it from disappearance and to pass it on to future generations.
Everything is entrusted to the work of a few enthusiasts who around the world do their best to preserve and protect.
In addition to cultural indifference, speculation also often becomes an obstacle to this work of safeguarding.
Floppy disks tend to become uncommon and there is always someone who, trying to make an exaggerated profit, makes the preservation work extremely expensive and impractical.
Then we have the problem of collectors who, lacking foresight, compulsively accumulate enormous amounts of material without transferring it or sharing it.
It goes without saying that this does not only concern the sphere of generosity towards others, of which unfortunately some people seem to be deprived, but above all the idea of file sharing and extended security against possible data loss or hardware malfunctions.
Without forgetting that a diskette not transferred and stacked as a trophy on a shelf in a few years will become

unreadable and unusable losing all its data and its economic value and thus not being able to be restored for the absence of a backup copy transferred.
A distinctive discourse must be made with regard to the preservation of the original and pirated software: the original software needs greater care and attention as it is much less widespread, difficult to find and above all difficult to transfer than the pirated one.
It contains protections, digital signatures, graphics and original hi-score, usually containing the names of the programmers, which very often in pirate copies are totally altered if not eliminated altogether.
On the other hand, however, pirated copies also have their dignity as they collect the ingenuity of the other side of the coin: hacking.

We can find the elegance of unlocking a protection with cracking, or the introduction of a pirate distributor, the trainer to make the game easier, often decisive in those games that, due to some bugs, can not be played entirely, without counting the alternative loading screens, the demos, the improvements to the game if not even the expansions of the levels.
There are many versions, revisions, compilations and various collections, even amateur ones, of programs or games that deserve to be preserved and documented.
Even the most anonymous or the most insignificant diskette/tape can conceal something that had been lost track of or memory of: lately I have told of a game called "LIFE" and written by Cees Kramer (the author of Tic Tac Toe and Snoopy) of the RadarSoft of 1984 of which he had completely forgotten the existence and which was dumped by an old cassette labeled "cassette 1" https://www.mediafire.com/.../9516rjbkjr.../life.prg/file...

Let us also not forget that dumpare together with sharing allows us to compare the memories between those who lived those times and thus be able to reconstruct and document a past that otherwise would be lost by those who have not lived it.
In short, it is right to preserve every single disk that is original or pirated because it is a piece of history that, in addition to individual data, also preserves a historical and cultural context that deserves to be handed down to all those who come.
Very often I hear someone say that "it's all online! everything has been dumped!" actually it would be fairer to say "they dumped everything!"
Yeah, because somebody took the trouble to do it, and alas, there's so much that hasn't been dumped yet.
Just follow GTW64 (https://www.gamesthatwerent.com/gtw64/) and discover new discoveries with amazement every month!
Do you know the story of **Duffy Duck**? It took 18 years to preserve this game! It doesn't matter if you think it's ugly or dull: it deserved to be preserved and handed down!
Read the story: https://www.gamesthatwerent.com/gtw64/daffy-duck/

At this point you could answer "But now the most important things have been preserved!".
I don't agree! Even minor games or programs have equal dignity and it is precisely because of this distorted idea that many games languish stacked in the accumulator collections where they will remain stored until maybe some empty cellars will put them back around or at worst

Dump Club 64
Preservare e Condividere
DUMPING
DOWNLOADS
ARTICOLI
UPLOADS
CONTATTI
Lingua
Rivolto principalmente al Commodore 64, il Dump Club 64 è un manipolo di appassionati di retrocomputing che si prefigge di conservare, catalogare e infine condividere su file il software dei vecchi supporti magnetici,soprattutto quello Italiano essendo questo molto meno diffuso.
Oltre al software, cerchiamo inoltre di includere nella nostra opera anche la scansione delle copertine, confezioni e di tutta la documentazione originale dell'epoca. Purtroppo il tempo, l'oblio e il campo magnetico terreste sono le principali cause per cui tantissimi applicazioni e giochi rischiano di scomparire per sempre dalla nostra memoria , speriamo con il nostro modesto lavoro di riuscire a preservare e diffondere quello che riteniamo sia un piccolo tesoro di valore storico e culturale. Oltre al dumping non disdegniamo anche recensioni di giochi, programmi, articoli tecnici e guide. Vorremo precisare che facciamo tutto senza alcun scopo di lucro e totalmente in maniera gratuita! Chiunque voglia contribuire e inviarci qualcosa può farlo attraverso la sezione upload: è tutto molto gradito e poiché di lavoro ce n'è tanto, chiunque voglia collaborare con noi è fortemente ben accetto.Cerchiamo per ampliare il nostro archivio, floppy e cassette per il Commodore 64 da dumpare. Il materiale sarà restituito al mittente dopo il lavoro di dumping. Se vi piace quello che facciamo potete anche contribuire inviandoci una piccola donazione, tutto quello che riceveremo sarà totalmente rinvestito nel sito.
PayPal
ULTIMI AGGIORNAMENTI
ECTO-1
NEW YORK
SOCCER SPECTACULAR

Fig. 1 - The homepage of www.dumpclub64.it. Visit it if you haven't already.

they will be able to landfill them (without thinking that in reality perhaps the data in the meantime will have already deteriorated!)

I can give you an example of this from my personal experience: no one has yet remembered the **PHM expansion disk Pegasus for C64: Advanced Battle Disk.**
I had an auction on Ebay for this record and I wanted to buy it to dump it! the Auction skyrocketed and in the end there was no way to buy it!
Since that time it has been years but the buyer has never dumped it or if he has he has not shared it!!
GTW was not even aware of it and kindly after my report an entry was inserted for this game not dumped! To date it is not yet found!!
Want to talk about Italian software??? Together with Roberto in the last year we have preserved many applications that were not found!
Even the heroic friends of Ready64 had failed to bring to light many applications of the Lions that are now available to everyone on the Dump Club 64 website.

Alberto Teodoro (who is not only an exquisite person but also one of the most authentic and generous enthusiasts I have ever met) was the first to dump the Basotter (a program to expand the controls of the BASIC C64 to allow the management of the plotter 1520 written by Giorgio Chiozzi).

Roberto for his part is giving blood to dump all the ribbons of the ARMED. You should see it as he regulates the azimuth of the Datassette or as he erases the traces of the purchase of the CUTE32 from his wife (who if he knew I think at least would have reserved a cup of polonium tea for him in the morning).

Want to talk about **Giuseppe of Lillo** and his 8bit newsstand? Have you ever seen his preservation work? It's awesome!

The **Ready64 Team** I have already mentioned but have you ever seen their site?? Do you have any idea how much work and what immense contribution they are making to documenting the Italian production of software for C64?

What about the **Chalk Board PowerPad**? I am sure that many will not even know about its existence! Well, I... Roberto bought the cartridges perfumed and I dumped them!
I opened a request on the Deputy's "Feature Request" by sending the dumps (anyone can download them) and if in the future the DEPUTY will support this hardware it will be thanks to the fact that someone dumped and shared them (https://sourceforge.net/p/vice-emu/feature-requests/366/)

I would have many other examples to do and I also feel guilty not to mention the work of many other Italian and foreign friends who dump, test, rename, scan and document in many ways (reviews, videos, podcasts, interviews) everything that encloses the universe of retrocomputing but I fear that I could be celebratory and then at the end of the day I prefer to talk with facts rather than words!

I apologize for being so long!!
I will be forgiven soon by releasing the aforementioned Dumps Amiga along with other dumps made by Francesco Galluccio, an exquisite person who I would like to thank publicly for the invaluable help he gives us and the great generosity: not least that of having shared the dumps of his Amiga diskettes: among which there are many goodies never seen around.... yet another demonstration that dump is always the right thing!!!

Greetings to all!!
Alessandro

The entire editorial staff of RetroMagazine World supports and appreciates the work of the persons at DumpClub64.

We invite our readers to collaborate with them in case they have material to preserve and/or to share with all retrocomputing enthusiasts.

GALAGA on C64, by Arlasoft

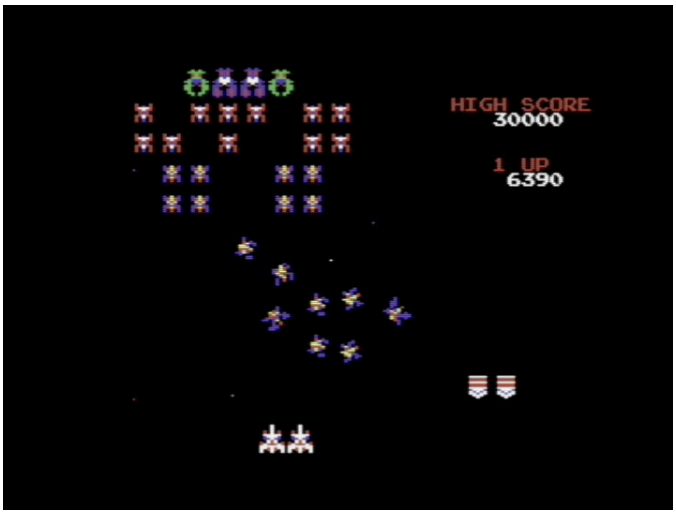
by Mic the Biker Novarina

It seems impossible but there are not a few historical video games that never saw the light of day on Commodore 64, or at best they were made in such a basic way that they were put in a corner almost immediately. Arcade games that have linked their name to history, writing the foundations in the early eighties, and continuing in the years immediately following. Games that, if you think about it, are fully accessible to the immortal 64K machine, especially if you think in modern terms, but they probably weren't so trivial at the dawn of Commodore's eight-bit home. Galaga is part of these games: approximately in 1982 it was converted for a “bread bin” still to be discovered. The version in question has practically nothing to share with the original game room: it was monochrome and the ships were composed of letters and cursors. The years passed, forty to be precise, and with today's knowledge and means we have in our hands an almost Perfect Pixel.

The story

Let's brush up on the textbooks: Galaga is an arcade game, like a fixed-screen shooter. It saw the light in 1981 thanks to Namco, while in North America it was released by Midway Manufacturing. The game was born as a sequel to Galaxian, released in 1979, Namco's first big hit in the arcades. As in any respectable shoot 'em up, we have the arduous task of destroying the villains on duty, in this case the aliens Galaga. Obviously the task will not be the simplest since we will have to slalom between enemies and bullets. Some of them can capture our ship through an attractive beam, but we will see later how to turn this situation in our favor. Probably, this brief summary, for almost all the readers, is a triviality but let's not forget the younger ones, who perhaps have just discovered this piece of history. Galaga, we said earlier, is a fixed-screen shooter, a very common game mode in the early eighties, where managing scrolling could be a big problem. We have the task of piloting a starfighter that moves in the lower part of the screen, limited in its movement to the right and left directions only. The goal of each level is to defeat all the aliens of Galaga, who will arrive in formation from the top and sides of the screen. Here the dynamics of the game are similar to Galaxian: after deploying, the aliens will dive towards the player, also shooting at us. Contact with bullets or aliens will result in the loss of a life.

At the top of the lineup are four great aliens called Boss Galaga: to destroy them you need two shots. These are the stinkers who, using the attractive beam, capture the player's ship. After doing so, they return, with the prisoner, to the top of the formation, causing us to lose a life. But, in the case of other available lives, we can redeem ourselves by shooting down the Boss Galaga who keeps the captured ship: doing so while he launches towards us will make the captured ship join the one in use. So we have a powerful double fighter, with double firepower. Be careful, because if we destroy a Boss Galaga with the prisoner while he is in formation, the fighter will side with the player and act like an alien. Some enemies can transform into new types of aliens, with different attack patterns, one of which takes the form of Galaxian's flagship. Phases are indicated by symbols located at the bottom right of the screen, while enemies become more aggressive as the game progresses. The third level and then every four of us will



have a bonus level: here the aliens fly in a pre-established formation without firing a shot.

Finally on Commodore 64

It took 40 years, but finally the “bread bin” has its Galaga conversion, and it's something crazy. We have to thank Arlasoft for this show. Reading their website they immediately give us the answer to the question: why did they have to spend 40 years? The reason is simple, that is the aspect ratio of the eight bits of Commodore. The arcade version has a screen height of 288 pixels, while the C64 only allows 200 pixels. The author calls into question the NES version, which was once a masterpiece and exploited an area of 224 pixels: the idea was to "open" the upper and lower edges. Once this first obstacle has been overcome, another not insignificant obstacle arises: the number of sprites. The NES version, due to its technical limitations, was not very fluid in the movements of the formations. Hence the second flash of genius, or do not use sprites for enemies in formation. In doing so, thanks to a modified version of Shallan's multiplexer, the sprites available are many and usable for enemies on the move. The game was compiled in Kickassembler, with the help of Sublime Text, Charpad and Spritepad.

It may have taken 40 years but experience teaches, so in this conversion we find the mode that ensures Galaga an almost infinite longevity, that is the cooperative two player mode. Two players side by side to defeat the alien hordes but the usual three lives to be divided in two, competing for the best score. This factor is not to be underestimated since the last life can only be lost by the player with the lowest score. Needless to say, this mode raises the quality of the game to levels impossible to imagine: gameplay increases while longevity skyrockets. Two players side by side, there is nothing better in a video game!

Biker thoughts

Unbelievable guys, Galaga after 40 years hits hard as if he had just come out. A shoot 'em up with an ultra simple and immediate game dynamic, but for this reason immensely fun right from the start. The game is constantly improving, you can download it for free at the link https://arlagames.itch.io/galaga-c64. Updated versions are released that gradually solve some small problems of youth, such as some mirroring of the sprites in the upper and lower edges, or some bullets that remain on the screen. The flicker, which can happen when the screen is saturated with enemies and bullets that by chance are arranged in a row, is an insurmountable limit of Hardware but honestly it has not yet happened to me. We thank those who, like these guys, are giving a new youth to the Commodore 64, bringing out incredible and definitely unthinkable games in the eighties. It may have taken 40 years but it was definitely worth it!

Turbo Out Run... Justice is served!

by Mic the Biker Novarina

Dear readers of Retromagazine, with Turbo Out Run we are going to live the fantastic Christmas 1989. The DeLorean has a full tank. Let's set the date to December 20 of that year and jump to 88 miles per hour.

The fog welcomes us with its mysterious embrace in what many will remember as a strange winter. In Turin, in the morning and evening, there was always that typical fog "from Silent Hill", while during the day it was hot. This made life easy for us, the "gang" of Borgo San Paolo (Turin, Italy) . After school we were always around and then stopping by someone's house to warm up the "breadbin". In one of our area exits we had gone from the good Marchisio in Via Pollenzo to get that great game that responds to the name of Turbo Out Run. The review on "zzap!" left no doubt about it: the turbo version finally did justice to the name Out Run. It was a strange time: three fantastic racing games that came out in the space of two months. Undisputed masterpieces such as Power Drift, Stunt car racer and the game protagonist of this article.

Turbo Out Run in the arcade wasn't as cumbersome as its predecessor, it didn't have the charisma or its history. While Out Run (of which you can find a good paper in the issue 28 of RMW ITA (RMW 6 ENG) recognized him on the fly and always made his head spin, his following was much less noticeable: many of us, initially, believed it was a follow-on born exclusively for home computers. History tells us that Turbo Out Run is a 1989 arcade racing game published by Sega. There is always a Ferrari as the protagonist, this time an F40, strictly convertible. The mechanics of the game have changed since the first chapter: now we have a pre-established route through all the continental United States from New York to Los Angeles, a real coast to coast. In addition to a time limit, Turbo Out Run also adds an opponent, in addition to the chaotic traffic of American roads. We find ourselves challenging a CPU-driven opponent driving a Porsche 959, a rival car of the F40 at the time. Even the "Turbo" of the title really exists: the car's V8 engine is supercharged by two IHI turbines. It plays a crucial role as players can take advantage of it to receive a short performance boost. The turbo is activated by pressing a button on the side of the gearbox mounted on the console. But watch out for the temperature of the engine, which in these situations rises in a worrying way. When the indicator reaches "OVERHEAT!", the turbo boost cannot be used until the temperature decreases. A great arcade already like this but the surprises are certainly not over here. In the pure tradition of stars and stripes sometimes appear police cars that try to stop us. They are particularly boring, we have two ways to get rid of them: overcoming them by using the turbo boost or spurring them off the road against some obstacle. The coin-op also gave us the possibility to choose between the classic two gears or the automatic gearbox. Every four cities reached you can choose a boost: Hi-Power Engine, Special Turbo and Super Grip Tires. It is our dignity to stand in front of the German rival: if the Porsche reaches the power-up before us, in the next race our fickle blonde will move towards the opponent's car. Heck, it was the same thing that happened in Borgo San Paolo in the raids on two wheels: the most beautiful and fastest bike arrived and you stayed in one place. Here, however, it was easier to vent pride: reconquering the girl is a duty, so you have to beat the opponent on the next

check for changes. If we manage to defeat the opponent with the girl at our side, a bonus of 1,000,000 points is awarded. In addition, the girl kisses the driver in front of her opponent, who in real life had to sweat much more.
Nothing to object to, a grade A coin op available both as a stand-up cab and as a super cab looking like a Ferrari F40, but victim of his predecessor: the first Out Run is a game that marked a decade, a game that has become the symbol of a historical period. Fortunately, the conversion for Commodore 64 was done by Probe Software, and the end result was to tear one's hair out. I was also among the many who played coin op only after playing on the "breadbin". I've seen that cabin a hundred times, but I've never put a coin in it.

Turbo Out Run, endless games

Turbo Out Run was the symbol of that Christmas, of those holidays spent with the friends of the Band of Borgo San Paolo. Most of the time with Adriano, playing a screen each. Because so, while you were not supposed to play, you could stand there, breathless, admiring that absolute masterpiece. During the journey the weather conditions will change and you will happen to compete between snowstorms, rain, hot sun, desert and nights full of stars. I remember that from the loading screen we had already fallen from the chair: the care in the image has something mystical. And music, guys: here we are in front of history. The musical accompaniment, by Jeroen Tel, is something crazy. The brilliant and talented musician invents a remix of the song of the first historic Out Run and makes it all to absolutely legendary levels. But let's proceed in order. When you press the joystick button and start the game itself we risk being killed: graphically Turbo Out Run erases a single second the horrible memory of the conversion of the first chapter. Aesthetically it is very detailed: colorful, fluid and equipped with a unique variety. The Ferrari F40 and Porsche 959 are reproduced almost perfectly: reviewed today we are at the top level of pixel art. The other vehicles are also incredible and despite the spectacular speed of the game we have often been able to recognize the models. We have seen Porsche, Corvette and some edgy Jeep like those of the time. Speed, as we said before, is made to perfection. The classic ways to make the effect in the games of the time are all there: the wallpapers flow, whether they are houses or trees. The parallax background moves like lightning from right to left. Few other times on the little monster of the house Commodore was given such an impression of speed. Playing Turbo Out Run was one of those momentous experiences, it carried weight away from your room. This is also thanks to the in-game music of THE MANIACS OF NOISE, who do not know how they managed to make a series of breathtaking songs and throw in the sound fx. We must thank that crazy Jeronen and his mastery with SID: apart from his natural good taste as a composer, on a technical level there is no match. The percussion seems immense, they come out of who knows where while the synthetic sounds typical of the processor reach unprecedented levels.

Biker thoughts

Outside the fog seemed to look at us. If you stared at the window, you saw it moving sinuously, hypnotically. I could see the look in his eyes sometimes. The soundtrack to this journey was the music of Turbo Out Run, while the game itself was something extra bodily. Only the video game gods know how much we loved this amazing car game. Turbo Out Run turns out to be a perfect conversion, not only technically but just like gameplay. The manoeuvrability of the car is like that in the games rooms and the difficulty level is calibrated so as not to stress. It is growing, it leaves you time to take the hand, to feel the wind in your hair but then rises making the challenge quite challenging.

It was Christmas 1989, a Christmas linked to Turbo Out Run for us "gang" of Borgo San Paolo. I remember December 31, in Adriano's house in Via Polonghera, with the commodore still in the beautiful living room, the one with the comfortable sofa. The afternoon sun had driven away the grey mantle for a few hours and gave us the feeling of being really in the game. One game each, while "tick tock" the pendulum clock quietly strikes the time. The light outside had gone to sleep behind the houses and the time to go to the New Year's party at a classmate's house was approaching. We never played dressed so well in our lives, and while we were at the party, between dances, there were mystical tales and rumors about a crazy racing game for the C64. A game that took the racing game per excellence but with the turbo.

Justice is served.

ListAmiga - Top 10 AMIGA esclusives!

by Giuseppe Rinella

Welcome back to you, sisters and brothers grown up like me under the reassuring protective wing of “mother” Amiga!

This month I want to propose another nice list, one of those to show off with my heart swelled with pride, maybe to a retrogamer like us raised in the 16-bit era.
Yes, because those who, like me, grew up with their Amiga 500 in the early 90s, lived that duty to chase the newborn consoles of Nintendo and Sega, which became the new term of comparison and for which several masterpieces were produced. Of course, comparing A500 to SNES and Megadrive did not make much sense, just because of the different age of these machines.

But go and explain it to a 10/11 year old boy, who does not understand why Street Fighter 2 on SNES has remained that epochal masterpiece consumed in the arcade, while the Amiga version was good just for the plate/floppy shot. Not to mention some exclusives, playing Sonic for the first time at a friend's house was a shock for me, Amiga at the time there was nothing even comparable.

But there have been games that have made us say a lot "take that!" to our proud friends who own these consoles, games that only we in the great Commodore family could enjoy.

So let's not waste any more time and go with:
TOP 10 AMIGA EXCLUSIVES

Lionheart
Let's start immediately with a big shot, with one of the most spectacular titles ever released on Amiga, which showed what could really be obtained by squeezing the hardware available, and how much that hardware still had so much to give, despite carrying on its shoulders a certain amount of years.
To think that this title came out when Amiga had been on the market for eight years, makes it even more incredible, as a monument to the Thalion boys who made it.
Lionheart is an amazing action/platformer to say the least. The graphic appearance gives you the Stendhal syndrome, a quantity of screen colors never seen before, excellent and abundant perspective parallax, moving clouds, exceptional water effect. And again, monsters of all sizes are beautifully made and impeccably animated.
The music is no less, epic and dramatic, extremely evocative and of superfine quality, perfectly in line with the rest of the production.
But Lionheart is not only appearance, there is substance and not little.
On the playability front, you can't really object to Lionheart, thanks to the variety of moves of our man/lion hero, a very high quality level design and a practically perfect balance of difficulty.
Exploring the vast levels in search of hidden secrets to be discovered is a real pleasure, for the eyes and for the spirit. Rich in classy touches scattered everywhere, starting with the great animated introduction.
A wide variety of settings and situations complete a truly fulfilling experience.
Example of such variety is level shoot'em up riding our flying dragon, which shoots fireballs from the mouth, visually sublime. Just like the level on the saddle of... I don't know, some kind of bipedal dinosaur...whatever it is, it's magnificent.
An impressive game that would not have disfigured on the 16-bit consoles, but that would also have made a great impression in the game room.

Ruff'n Tumble
A real delight, however, wrapped in a great veil of sadness, this was Ruff 'n' Tumble.
The title in fact saw the light precisely in the year in which Commodore's bankruptcy was declared, the Amiga era was therefore over, as was the 16-bit era in general.
At the end of the year 1994, Sony released its Playstation and the rest is history.
But in the game there was no trace of such sadness, on the contrary, what it offered were massive doses of fun, destructive fury and pure adrenaline.
Ruff 'n' Tumble is a truly exceptional platformer/shooter, with a sparkling graphic outfit and music that exalts as few. Four worlds divided into different areas full of evil beings to be eliminated mercilessly, while we pursue our purpose, namely the collection of the number of marbles necessary

to be able to access the next level. Not before defeating the hostiles but wonderful bosses at the end of the level. Playability is dedicated to the frenzy, with simple and effective mechanics, such as the progressive exhaustion of weapons regardless of their use, thus encouraging us to quickly destroy everything that happens within reach. The music, which pumps properly, helps to keep a high rhythm, frenetic and without pauses.

Frenzy, however, combined with the exploration of vast and well-studied maps, full of secrets to be discovered, which highlight how the level design has been taken care of in every detail.

All this combined with a difficulty trending upwards but never unfair, makes Ruff 'n' Tumble an explosive and moving greeting to our beloved Friend.

Apidya

There is a very specific reason why Apidya can and should be on this list.

The title is the most classic of the horizontal slider shooters. We will not have to deal with alien spaceships or environments that recall past wars.

In fact, we will play a bee and our enemies will be very hateful insects and other animals to be eliminated, which populate the different environments in which we will venture, with the sole purpose of destroying us.

Apidya is a title of the highest quality, graphically excellent, with many enemies present at the same time on screen, also of considerable size (in particular the bosses at the end of the level) and all this without the slightest slowdown or hindrance of any kind.

Various settings and really well made, playability without particular defects, difficulty quite high as per tradition for the genre of belonging.

Let's face it, however good it is, Apidya does not invent anything and both Amiga and the "rival" consoles certainly do not lack excellent exponents of the same genre, so what has this particular title that others do not have? To understand it (but you already know it of course) you will have to turn up the volume without any restraint!

Already because all the music, from the intro to the accompaniment during the short loads, up to those of each stage, are the work of the master Chris Huelsbeck. I renew the invitation to turn up the volume to believe, the music is something exceptional.

If you want to enjoy so much beauty, without worrying about having to survive the murderous fury of insects of any species, don't worry! Go to Spotify and you will find the complete soundtrack of Apidya, then tell me for how many titles of the time it happens.

Try to listen to "Techno party" without getting excited and standing still, I tell you immediately that you are destined to fail.

Recommended at maximum volume, in the car including your elbow outside the window.

Darkmere

I love Darkmere very much.

I still remember the magazines that announced the release in advance, on those photos I literally spent the hours. Once the game came out, I spent many more in his company. Speaking of the dear good old days with proud owners of Amiga like me, this title has never been among the classics that are mentioned. The same happens in the different rankings of the best games on Amiga that happen to read, or that are found on YouTube.

In my opinion, this is completely inexplicable.

Darkmere is a wonderful action/rpg.

Graphically it is a real pearl, one of the best aged Amiga titles. I mean, if a title came out today with a Darkmere-grade pixel art, it would gather open-stage applause.

Three huge levels to explore far and wide, full of things to do, people to talk to and monsters to eliminate.

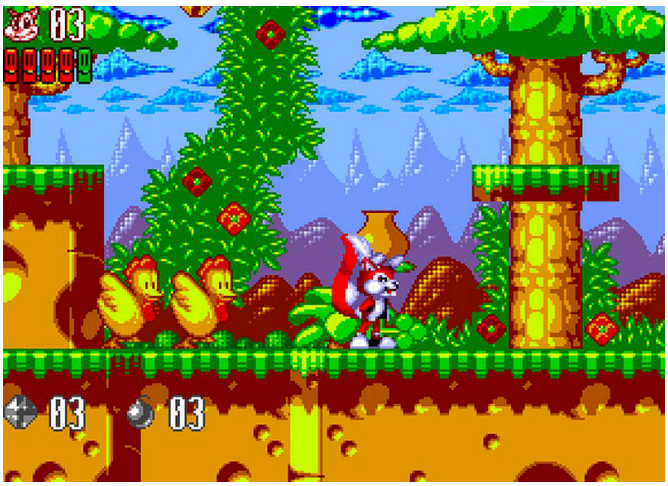
The whole adventure is pervaded by a dark and gloomy atmosphere, as few have seen on Amiga and beyond.

The first level, the village, from this point of view is an authentic masterpiece.

Walking through the dark and semi-desert alleys with the constant whistle of the wind as a background, entering the wonderful and welcoming houses (who has never wanted to stop a little in front of those hot crackling fireplaces?), with the constant sense of oppression and imminent danger that accompany us is priceless.

Darkmere, however, is far from perfect. The clashes with the monsters we will encounter (orcs, dragons, barbarians with a strong resemblance to Goro by Mortal Kombat, number of arms apart) are nothing to be missed, on the contrary. The difficulty is not very high, the slowness of the opening of the inventory if too full (really annoying), loadings not very fast.
All these defects, however, do not in the least affect the beauty of this adventure that actually lasts too little. Not that it is short, even so Darkmere takes his time to be finished, the truth is that he would want more and more.
Darkmere is an adventure to be lived at least once in a lifetime, enjoying every single pixel. I bet once you're done, you'll come back every once in a while to take a walk through the village's dark alleys and into its beautiful homes.
Finally, without wanting to spoil anything, watch out for the sensational final twist!

Mr Nutz: Hoppin' Mad
Mr Nutz's story is quite peculiar.
It is in fact an exclusive which is not an exclusive, let me explain.
Mr Nutz was developed by Ocean for Amiga, which was already in decline. It was then decided to publish the game for Super Nintendo and later on Megadrive. This choice, which was 1993 at the time, made complete economic sense.
The game was not bad, an honest and fun platform but nothing that left its mark, especially considering that on the two consoles, for any title belonging to that genre, the terms of comparison were Super Mario World and Sonic.
However, Ocean decided to publish Mr Nutz also on Amiga, and here is the peculiarity of the story: the title was not "trivially" converted, instead a completely different game was developed, which with the counterparts on the console had only the protagonist in common. The title also changed slightly, becoming "Mr Nutz: Hoppin' Mad".
But the most important thing was that the game on Amiga was clearly superior.
The developers were heavily inspired by Super Mario World for some things (the map through which to access the different levels, full of secrets and characters to dialogue with) and others by Sonic (the gameplay is quite similar, as well as some settings).
I mean, nothing original but incredibly well done. It is no coincidence that the developers were the guys from Kaiko (incorporated by Ocean), the same ones from Apydia and who therefore knew what they were doing.
Mr Nutz is fast, colourful to the point of touching the psychedelia (see the bonus levels, also inspired by those present in Sonic, but not only those), technically impressive and not at all short.
It is one of the best platforms on Amiga, this is certain, inexplicably snubbed by critics and (often) the public.
I remember that it did not enjoy great consideration from the press, perhaps thanks to the fact that the days of Amiga were then numbered, the few titles that came out at the time were obviously not of great interest.
Mr Nutz also shares with Darkmere (and many other titles) the strange fate of a too forgotten game, certainly not celebrated enough.
For those who do not know it, or vaguely remember it, if you love it, run and retrieve it.



Benefactor
Here we are with one of those titles that you can love and hate at the same time.
Developed by Digital Illusions, which delighted all of us with the best pinball on Amiga (Pinball Dreams and Pinball Fantasies until then, later also Pinball Illusions), Benefactor is a puzzle/platformer really done right.
The purpose of the game is to solve the different environmental puzzles in each level, in order to free the children (I think they are children, if they are not, it is still about being small and chubby) unjustly imprisoned. Having done this, we will also have to lead the aforementioned children (or presumed children) to the exit of the safe level, paying attention to the fact that they tend a little too much towards suicide, a little Lemmings style.
It will therefore be all a jump on platforms, operate levers, open doors, use passages that lead to different points of the level, all avoiding being eliminated by the enemies

present. Starting from the aesthetic aspect, Benefactor at first glance may not be of great impact, it is not as spectacular as Lionheart for example. It's all very small, from our alter ego Ben E. Factor (the name of the protagonist) to the settings, with everything in between.
In reality everything turns out to be extremely well cared for, divinely made and even better animated. I don't expect the latter to be anything but trivial, when anything on the move is made with a handful of pixels. The small size of everything means that the levels are in fact quite extensive even though they occupy few screens.
The sound is definitely of good workmanship, with music and effects always right.
Speaking of gameplay, Benefactor is hard. Very difficult as well as satisfactory.
As we progress through our adventure, the levels will be bigger and more intricate, the puzzles to solve more and more complex and the enemies more numerous and fierce.
In addition to all this, however, Benefactor is a rather punitive platform, the jumps will have to be calibrated to the pixel, not at all easy when everything is so tiny.
Hence that love/hate mentioned at the beginning.
If you have patience and firm nerves, Benefactor offers pure fun and extreme satisfaction.
It is very likely, however, that your joystick will not survive your fury.

Walker

Walker is a particular title.
This is a shooter and horizontal scrolling, with some features that differentiate it from any other title.
The protagonist is the Walker that we will be called to pilot, a highly destructive robot, aesthetically inspired by the ED-209 present in Robocop (the bad robot in short).
At the helm of our fearsome vehicle, we will face four levels set in different places and times. We will start in Berlin in 1945, Los Angeles in an indefinite future, the Middle East in our day and finally still in the future in an unspecified place.
The goal is to eliminate anyone and anything we meet on our way, including end-of-tier bosses.
The first peculiarity immediately evident is that the scrolling of the levels takes place from right to left, unlike how we are used to in any title that develops horizontally. Nothing useful but not even disturbing, just a little weird.
Another aspect are the controls, to drive our robot we will have to use joysticks and mice, with the first we will move the Walker back and forth, with the mouse we will manage the scope and fire.
Technically speaking, our robot is made really well, the animations are excellent, the movement of the head (with two beautiful machine guns connected to it) that "follows" the viewfinder is a real touch of class.
The enemies are well made, from tiny (compared to us) men to vehicles, there is some disproportion here and there but nothing tragic.
The settings are not very convincing instead, everything is a bit too dark and chromatically monotonous, certainly contributes to making everything gloomy and oppressive (we are still at war) but in a short time it is tiring and anonymous.
The sound is very accurate, the absence of music is an ideal choice given the general atmosphere, the sound effects are excellent, particularly satisfactory the noise of our deadly machine guns.
Small note: the possible presence of an expansion of memory to 2MB, allows the reproduction of additional sound effects, including radio communications with the Walker.
Walker has a great flaw, unfortunately: a superhuman and totally absurd difficulty to say the least.
I don't think there was ever anyone who completed this game without cheating. In fact, I doubt that anyone has ever passed the second level by playing "clean."
Despite this, I spent hours and hours playing Walker, the satisfaction and the sense of omnipotence that driving a hyper destructive robot gave away, were priceless.
The joystick+mouse controls (with a little imagination) really made me feel like a robot pilot, for those like me who grew up on bread and Goldrake was no small feat.
If the level of apocalyptic difficulty does not scare you, Walker absolutely deserves to be tried, even just for that sense of drunkenness that you feel only driving a devastating metal giant.

Agony

Treating Agony like any other game is completely out of place, it must be said.

Agony is an experience, it is the game that becomes a pretext to spread art and beauty.

First of all, let's deal with the formalities: Agony is a shot 'em up with horizontal sliding, nothing particularly original, except the possibility of casting spells thanks to the scrolls collected during our adventure, an unusual element for this genre.

It is not very long with its six levels, at the end of which we will clash with the final boss.

The difficulty is medium/high, more difficult in the second half, nothing excessive anyway.

Agony was developed for Psygnosis by Art&Magic guys, the name was never more suitable.

That said, Agony is a disarming beauty.

Whatever you see and hear in Agony leaves you speechless. Starting from the home screen, an image of fine workmanship, accompanied by wonderful and heartbreaking music.

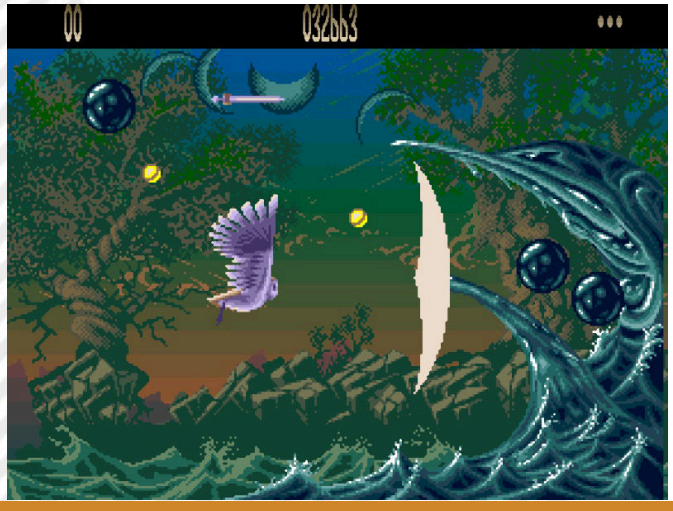
The owl that we will find ourselves "impersonating" is something impressive, animated in a sublime way. The enemies we will face are no less, their animations are certainly less complex and refined, but the generous size, their variety and the design, to say the least, inspired, makes them just as spectacular. The bosses at the end of the level are majestic to say the least.

What about the backdrops? Sublime, real moving pictures, technically impressive. Numerous levels of parallax, all animated excellently. From the stormy sea in the first level to the waterfalls of the second, then continuing through dark and intricate forests to the dramatic burning trees of the final level.

Everything about Agony is highly spectacular and evocative. The music tracks that accompany our adventure are of rare beauty.

Connecting your Amiga to a stereo is imperative, turn up the volume and enjoy the epic and majestic music, even from this point of view Agony gives us emotions and pure joy.

Never before have you seen and heard anything like it, maybe not even after and I'm not just talking about Amiga. Very rare case in which it is preferable to attend a game, rather than play in person, so that you can enjoy so much magnificence in every detail, without having to worry about anything else.



Agony is the video game that puts itself at the service of art. What a wonder.

Premiere

On the platform side, Amiga offers excellent titles in large quantities, Premiere is definitely among them, with a touch of originality that does not hurt.

The protagonist of the story is Clutch Gable, a young film editor who one night, falling asleep during his turn, is robbed of six films by a mysterious character.

Our task is to recover them obviously, completing the six necessary levels, which are nothing more than sets of six films, each belonging to a different genre. We will start from the set of a western film, continuing with the silent one in black and white, the horror film, the cartoon, the sci-fi film and finally the one set in the Middle Ages.

Technically Premiere is really well done, not a miracle but he has nothing out of place.

The cartoon-style graphics are colourful and everything is animated excellently, from the protagonist with his dancing tuft to the different enemies we will meet. The themed settings are impeccable and perfectly make the atmosphere of each film.

The music, also themed with different genres, are made very well, very enjoyable.

Premiere is a classic 2d platform but with two levels of depth, we can go from one level to another to avoid obstacles, enemies, reach levers and more. In each level we will have a single weapon to shoot down the damn enemies, which will change depending on the set.

The levels are really huge and to be explored far and wide, activating levers, avoiding traps and taking advantage of the different steps that will lead us from the set of the film to the backstage and vice versa.

Concluding each level we will face the boss on duty, clashes that will prove to be real mini games, not always of immediate understanding.

I remember it wasn't easy for me to figure out how to defeat the first boss. Surely it was not fast, in fact losing all lives we will be forced to repeat the entire level to be able to face it again.

Finishing Premiere takes a good amount of time and is not at all simple, but doing it is a real pleasure.

Some defects it has, for example for some enemies it is difficult to understand on which "plane" it is (in particular the flying ones) and often for this reason they will hit us, with consequent waste of energy. Some of the many levers that we will have to operate, indistinguishable from the

others, hide traps that will damage us, a somewhat "unjust" mechanism if we want.
But I mean, let's not talk about anything excessive.
Premiere absolutely deserves to be (re)played, it's fun, visually delicious and as challenging as it gets. Absolutely to be recovered.

Shadow Fighter
When it comes to the best games on Amiga, it's impossible not to include Shadow Fighter.
In addition to being an excellent beat'em up to meetings from any point of view, Shadow Fighter has made all of us lovers of this genre happy who, for a long time, we suffered the absence of such an exponent who was up to the task.
Sixteen selectable characters (plus two "hidden"), each with a different fighting style, special moves in large quantities and highly spectacular.
Never before has Amiga seen such a well-crafted, varied and frenetic fighting game that it finally overcame the trauma of that obscene Street Fighter 2 conversion.
Graphically impeccable, the characters are beautifully crafted, large and well characterized. The internships are really curated and full of animations, without forgetting the perspective floor much admired in the Capcom masterpiece.
Even on sound you can't say anything, really good music as well as sound effects.
But it's gameplay that's the real highlight of Shadow Fighter.
The variety of fighting styles and special moves of the different characters ensures hours and hours of fun.
The historic limit of the only usable button, an obstacle for a fighting game (we were already used to the six buttons of SF2), is easily circumvented. It is incredible the amount of special shots and not that each character can perform using a single button, until that moment nothing like this had ever been seen on Amiga.
Played in single exalts, thanks to an artificial intelligence that will give you a thread to twist, in company becomes virtually infinite, like any beat'em up that respects.
Everything a game like this has to have, Shadow Fighter has.
We waited for years for a beat'em up like this on Amiga, among a thousand sufferings, we were finally listened to by the very Italian Naps Team, who from Sicily explained to everyone how to do it. They did not invent anything and it was not necessary to do it, they limited themselves (it is done to say) to realize the game that we all wanted, showing a technical mastery that more coveted studies could only dream of. Shadow Fighter was the game I had always wanted to be able to play in my bedroom, which I did for several months without interruption. Naps Team, wherever you are, I will never stop loving you.

Even for this list, we've come to the end.

The invitation is always the same, come and visit us on our website and social channels and tell us what we have blatantly overlooked, among the best exclusive Amiga.
In the meantime, I'm gonna go get a new joystick, goddamn Benefactor!

Greetings to all of you and AMIGA FOREVER!

ZAXXON

by Christian Miglio

A good morning to you, friends of Retromagazine World, today your Elder wears a space pilot's helmet and with his starfighter flies in search of the enemy AI of the entire universe called Zaxxon!

Zaxxon, and it's history!

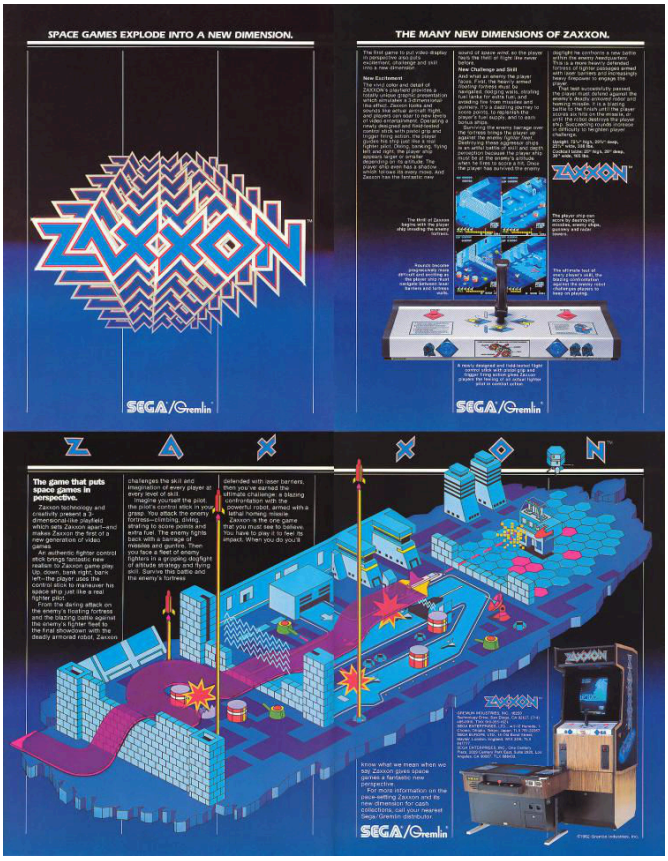
It was a winter morning of 1986 and my father's infamous colleague had passed him a nice craft box copied with the stereo, he knew how to do it because my trusty father the night before stuck it in the datassette and after all turns of tape, gave as result an absolute 'nothing'.
This cassette only by its titles was very juicy, it contained titles like Popeye, Pitstop 2, Empire Strikes Back, Gyruss, in short all games of a certain quality.
Among these came a very strange title, Zaxxon, it tasted of technology, it tasted of evil, it tasted of metallic and my curiosity as a 7 year old infant did not take long to raise the monkey so much so that the previously appointed bald father spent the whole night in an attempt to load even one of that tide of games contained in that 90 minute tape.

With the good night shadows in Las Vegas in the morning I saw him exulting, he had discovered that to load those games he needed the hated Super Turbo Tape 64.
Once the mechanism was understood, a nonstop day began, which ended in the evening with the two of us engaged in playing Zaxxon (which he did not know how to pronounce and called ZACCON).

In the evening with the light off and us smashing our eyes on the TV, it was ideal to play Zaxxon because the black background in the "space" part of the game gave the idea of being on a spaceship.

Overview and origins of Zaxxon

Zaxxon is mainly an arcade cabinet, for friends "bar game" decidedly very innovative for its time,
Released by SEGA in 1982, it belongs to the sliding shooter genre.
It was the first game to use a graphic representation in axonometric projection, a detail that gave the game its name (AXXON, from the English AXONometric, which means "axonometric").
The type of axonometric projection used is that of the isometric visual, an idea that was soon imitated by several other producers and especially also in other types of video games.



The controls, the nice ones

Even the cabin was innovative in terms of controls, because it included a very innovative joystick with which to control the altitude and lateral movement of the shuttle.
It is equipped with a top fire button and a red light to signal the fire of each shot.
In addition there are two other buttons on the control panel, both with the same function, one on the left, for the right and the other on the right for the left-handed pilots.
Using the Joystick button and one of the two side buttons it was possible to ensure a constant focus volume, which is very important as we will see later.
To give the player a better sense of depth, Sega decided

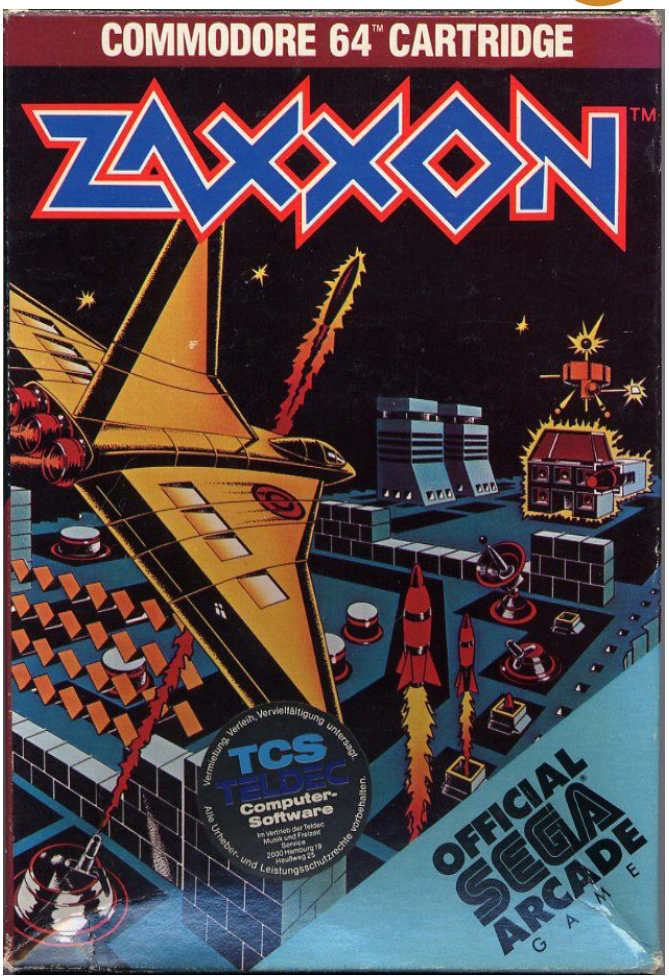
to provide the shuttle with a vertical shadow to indicate the altitude of the shuttle itself above the surface: it was the first example of shading implemented in a video game.
In fact, despite being a simple example of three-dimensional graphics, in 1982 it was considered by many to be the bar game with the best graphics ever and the impression aroused was such that two years later, at the time of the European launch of the MSX standard, advertising boasted the fact that "MSX has Zaxxon, with its fabulous three-dimensional graphics".
Importantly, the cabin was also supplied in two versions, the vertical in turn distributed in two slightly different cabs and the cocktail version.

Purpose of the game

The purpose of the game is to pilot a small starfighter on a suicide mission over a series of enemy fortresses suspended in space built on asteroids, until they meet and destroy the missile launching robot named Zaxxon.
It will have to make its way by machine gunning the asteroid city of the enemy trying to destroy turret cannons, fuel tanks and missiles, fighter but above all the bitter enemy robot Zaxxon.
With the help of the altimeter we can constantly control the altitude, while with the joystick in perfect Top Gun style, we will control the shuttle, making our way through more or less wide cracks in the walls, above or below the force fields, avoiding missiles that come out of the ground and, later in the third phase, dueling with Zaxxon, the insidious enemy robot.
A successful attack conducted through the first platform will lead to a clash in deep space (second phase) to fight against enemy planes that come to meet us.
In this phase we go up, turn or descend, a "crosshair" will appear on the screen to indicate the possibility of hitting the vehicle that comes to meet us successfully at that given moment with the laser.
In addition to the altitude, your score, the number of shuttles you have left, the number of enemy shuttles to destroy, and the fuel remaining are displayed.
When a fuel tank is destroyed, in addition to the points, notches are assigned to the level of our fuel.
At the end of the phase in deep space we enter again an asteroid stronghold where we will find the robot Zaxxon waiting, which can launch missiles in search. To destroy Zaxxon it will take six rounds directed into the robot's missile launcher tube, after which the level changes slightly, assuming a greater difficulty.

The C64 conversion

We don't have much to say about the C64 conversion except that two developers have fought in the conversion,



Synapse Software and U.S. Gold.
Personally, I enjoyed the Synapse version much more than being the first one I've ever played.
Synapse is primarily known for a number of popular action games such as Fort Apocalypse , Blue Max , The Pharaoh's Curse and Shamus , including some unusual games not based on established concepts such as Necromancer and Alley Cat .
The company also sold a 6502 database and assembler, as well as a host of productivity applications that unfortunately led to its downfall.
The company was finally acquired by Broderbund at the end of 1984.
In my opinion, the conversion for C64 has lost nothing compared to the arcade, except in spite of a very small loss of graphics for which the gameplay has not suffered

even if perhaps a small reduction in scrolling has occurred. The manoeuvrability is valid, you soon enter the mood of the isometric view and the inverted vertical controls as in flight simulators.
The original game was released in both cassette and cartridge.
In Italy the game was published in newsstands with the following names: Space Mission, Plane's fight, Zax Laser and appeared in the magazines Machine Language C64, Formula 64 and COM 64 all in 1985.
Attack Strategy
Once you have learned how to manoeuvre the shuttle in an excellent way, which as mentioned above is the only first-impact difficulty to overcome, it will be possible to start developing a "scheme" to cross each of the three sections.
Zaxxon is a game that must be played with an "attack" approach, not on the defensive, especially in the two citadels. The second phase, the one in space, is the hardest, it will be better to try to survive than to try to score points.
Destroying Zaxxon will be easier if we know where to place ourselves ,how to strike and where.
You have to have good flight ability. Generally it is better to try to fly low when we are on the strongholds while it is better to change altitude often when we are in outer space.

First phase

The targets on the ground are always in the same position on the platforms. The only things that change are the passages between walls. As you progress they become smaller and change position. The first trick to avoid bumping into something is to shoot. For beginners it is a solution, but in the long run it will not be possible to store all the steps in the various levels. Learning how to position the shuttle by looking at it in relation to other objects will allow you to move quickly and have time to fire on the targets and then be able to pass through the walls just as quickly. The shuttle can be destroyed in different ways,by colliding with underground missiles, or by firing cannons on the ground, or simply by running dry with fuel or crashing into anything.

Shooting on the walls and force fields to observe the exact point where we are hitting, graphically you can see the impact of the bullets and then adjust the position of the shuttle by continuing to shoot, so you can see where the bullets no longer impact and thus ensure safe passage through the force field or wall that is. This operation becomes increasingly difficult with increasing levels, but the test of fire should almost always ensure a safe passage.

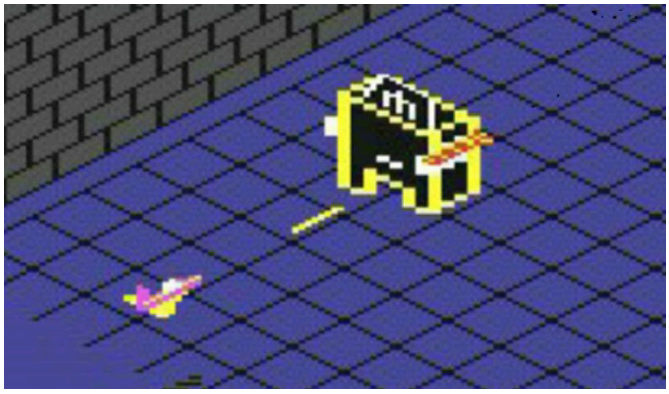
Second Phase or Outdoor Space

After crossing the last wall of the first citadel , we pass into outer space, where we will have to destroy the fighter planes. Most planes move with fixed patterns, but some of them will track your shuttle trying to shoot or collide with it. The aim is to get out of Stage 2 as quickly and painlessly as possible, shooting as many planes as possible to get a bonus. Identifying the pattern with which aircraft move is the most costly strategy.
You will need to learn to survive the air duels in outer space, without losing your shuttle. If we destroy 20 fighter planes, we will be rewarded with 1,000 bonus points. This score includes any aircraft on the ground that could be destroyed before reaching Stage 2. In any case, we always destroy fighter planes. It is usually a great strategy to change altitude immediately after hitting one, to avoid being hit by his last shot.

Third phase meeting with Zaxxon

The third phase is very similar to the first, only we will have to fly through small spaces in the walls. Once you understand where the space is located, you can plan the movement in advance. It is easier to see the shots fired reflecting on the brick walls than on the force fields, so the strategy is to start from the bottom, under the openings and shoot at the walls. After crossing the last wall, it is advisable to shoot at the tanks in order to load up on fuel for the fight against Zaxxon.
The maxi Robot Zaxxon marks the end of a round, it appears on the screen, always in the same place, so you

can start waiting for it before its arrival. We put the shuttle at 2 ½ notches on the altimeter and in the middle of the second hexagon from the left. We start shooting the robot as soon as it appears on the screen and we can score a couple of quick hits directly on the missile. Then we follow the movement of the robot, maintaining a constant flow of rounds in the direction of the missile. To eliminate it, we'll have to hit it a total of six times. With these maneuvers we'll have to be able to destroy it before it launches the



missile. If it launches, we align the shuttle directly to the missile as it flies towards us. If you can hit him fast twice, we'll still have time to destroy him by firing as fast as we can. It needs to be destroyed. If we can't destroy it, we're dead pilots. After destroying the robot as well, we will earn a flag and move on to the next round. If we earn enough flags, the game stops, inviting you not to give up (NEVER GIVE UP!). In this way, the game makes us understand that we have beaten it, but without mercy we can accumulate points infinitely.

Zaxxon Handheld & Board game

There are three different versions of Zaxxon recreated on Handheld:

VFD portable video game (1981) published by Coleco:
One of the most beautiful portable game conversions, Coleco's Zaxxon uses a unique combination of mirrors and two separate VFD screens to achieve a 3D effect. The ship appears to fly above the surface of the planet and indeed flies over walls and other objects generated by VFD (impossible with a single VFD shield). The surface of the planet and the enemies on the ground are created by a VFD, while the ship and the enemies are created by the VFD reflected by the mirror.
Portable LCD video game (1982) published by Bandai:
It has a nice double LCD panel (there are two LCD panels on top of each other). The double LCD panel creates a kind of 3D effect with the objects underneath in one panel, and those above in the other. In addition, all objects in the background are generated by the LCD and animated. Pretty awesome for an LCD game (it's a must-have collection for Zaxxon lovers!).

VFD portable video game (1982/1983) published by Bandai:
This game has a unique mode to recreate the 3D effect –

it uses only one VFD screen (unlike Coleco's Zaxxon which uses two. The VFD is basically split in two, the top half is seen as the bottom of the screen, while the bottom of the VDF is reflected on a semi-transparent mirror to create the top of the 3D gaming space. A nice idea to realize, and it really works as all the ships (and not just the player's ship as in the Coleco version, they have a real depth. Sometimes it's a bit difficult to play, as you have to be sitting exactly in front of the screen centered perfectly, but once you're in position, it's a very nice version of Zaxxon. It has airplane mode in space and flight mode on the ground. The only thing that really seems to be missing is the final boss of Zaxxon...

There are also two very nice board game versions published by MB, they differ for some details of the box and for the graphics of the game table and the checkers.

Curiosity
Zaxxon was released in January 1982.

- At the time of publication, Zaxxon was unique in that it was the first to use isometric projections, something like a three-quarter view. This effect simulates the three dimensions (although from a second person's point of view).

- In the game, Zaxxon is the name of the enemy robot you have to destroy. Milton Bradley has converted this and other Sega titles into board games. 'Can You Complete Your Mission Before Zaxxon Zaps You?'

- It was the first arcade game to be advertised on television, with a commercial produced by Paramount Pictures for $150,000.

- Vernon Kalanikaus holds the official cabin record for this game with 4,680,740 points recorded on 15/03/1982.

- A unit of Zaxxon appears in the 1983 movie ‘WarGames’.

- A bootleg of this game is known as ”Jackson”.

- A porting of Zaxxon for a home console is shown in the music video of the song "Blue Monday", by New Order.

- Zaxxon was the main theme of an independent 1986 film, "Hollywood Zap!".

- Zaxxon generated a sequel: Super Zaxxon. The color scheme was different, the player's shuttle flew faster (making the game more difficult), and the robot at the end of the second fortress was replaced by a dragon. It wasn't as successful as the original.

- In 1987 Zaxxon 3-D was released for the Sega Master System. This console variant made use of 3D glasses, an add-on that allowed for extra depth. As with the Atari 2600 and Intellivision ports, the game was forward scrolling rather than isometric

- Zaxxon's Motherbase 2000 was released for the Sega 32X in 1995. It was Zaxxon's first game to use 3D graphics. The game carried the Zaxxon brand only in the United States, the Japanese version was renamed Parasquad and the European version Motherbase

- Zaxxon was the first game reviewed on YouTube in the show Classic Game Room HD on February 20, 2008

- In 2012 Zaxxon was presented at the exhibition “The Art of Video Games” at the Smithsonian Museum

- A direct sequel, Zaxxon Escape, was released on October 4, 2012 for Apple and Android devices. The game was criticized for having little resemblance to the original arcade.

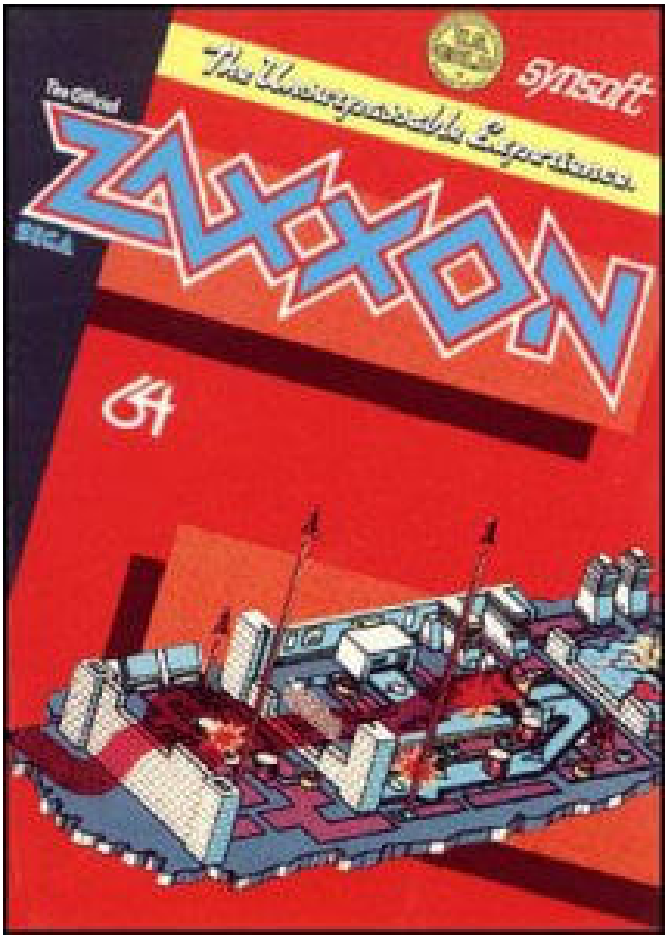
- Zaxxon has been a source of inspiration for other games, especially for the Blue Max series that owes Zaxxon its isometric perspective, but let's not forget a game that seems to be a shameless copy at least for the graphic part, Zaga, where we are in charge of a helicopter that must "simply" cross with the utmost precision a path made of walls, force fields and land safely in another area at the end of the level, only here there are no bullets to shoot to help us.

I couldn't tell you more than this!

Have fun Starfleet Pilot!

Goodbye friends to the next review!

The Elder's Corner... It’s here!
Let's Rock!

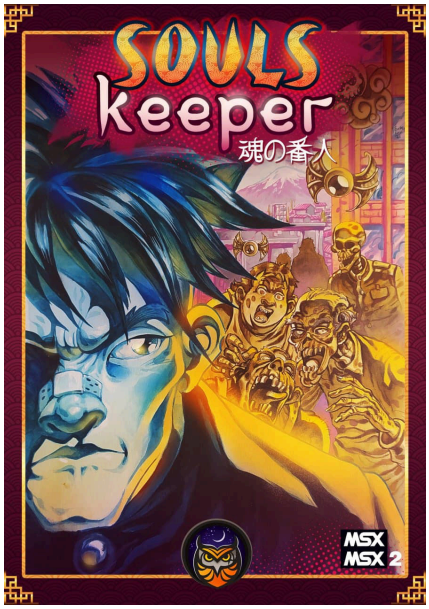


NEW GAME

SOULS KEEPER

Year: 2021
Developer: Oniric Factor
Genre: Platform/Action
Platform: MSX/MSX2
Website: https://www.oniric-factor.com/?product=souls-keeper-cartucho

The boys of Oniric Game are special. A collective of Spanish and South American programmers who really love retro consoles and retro computers. You can see it in their products.



Cared and refined. There is heart in their products and there is above all knowledge of what they do.
Souls Keeper reached us in the editorial mailbox accompanied by the Press Kit and the enthusiasm of the boys of the software house and immediately we went to try it.

It is a platform/action game, but nowadays it could be called Matroidvania.
The hero of the game will have to face a thousand dangers and terrible creatures in order to recover objects in the present levels and reach the final clash.
I must admit that technically the product is really well developed. The graphics are well coloured and functional. Fast scrolling, everything animated correctly and smoothly.
Vibrant and engaging sound.
Nice to see and hear.
At the level of gameplay we are faced with a game that requires a lot of skill and attention.

Our hero is equipped with an energy bar and this comes down every time you are hit by an enemy. We only have one life and we have to be good at holding on to it.
Souls Keeper doesn't forgive. It is a game with the taste of the past where you do not have tutorials or guides, you have to grit your teeth and study the best pattern to get out of trouble.

Personally I really appreciate this kind of approach, but I'm an old videogamer and I admit that a new player might be frightened by the initial mortality.
You have to hold hands and carefully evaluate the clashes with your opponents.

Pulling the sums we are in front of a good title for MSX systems (MSX and MSX 2), curated and offering a good degree of challenge.
You can purchase the game by clicking on the Oniric Factor page. Support them, they're really good!

by **Carlo Nithaiah Del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 80%
A product simple to play. Customizable in controls and intuitive.

» Longevity 75%
It's an old school title. It requires a lot of willpower and focus. Not suitable for the weak.

NEW GAME

BRILEY WITCH CHRONICLES

Year: 1997
Developer: Sarah Jane Avory
Genre: JRPG
Platform: Commodore 64
Website: https://sarahjaneavory.itch.io/briley-witch-chronicles

Before I even started playing the new JRPG-inspired game for C64, Briley Witch Chronicles, I knew I was about to see something special.
Are we looking at the best role-playing game ever on C64? Let's take it easy.
The author. Sarah Jane Avory began developing at age 11 on her VIC 20. She has made her passion for his work by starting a prolific collaboration with software houses such as Gremlin or Core Design... among her titles we can mention Thunderhawk for Sega Mega CD and Playstation and the legendary Jaguar XJ220. On Commodore 64 she has made numerous titles including Zeta Wing, SoulForce, Santron and many others.

In the meantime she has also become a successful author of books, including the saga of the witch Briley and her cat Smokey. This title for C64 is based on the first four novels in the saga, Spirit of a Witch, Storm Grey, Dark Secrets and Lies in the Dark.
The Briley Witch Chronicles is a paranormal fantasy series of carefree training with a dose of danger and a splash of love, which is very reminiscent of a style also seen in Buffy the Vampire Killer or other teen series.

The game begins when Briley Forester is torn from her world and dumped in the village of Maepole. Trapped in this strange magical universe, she discovers that she is a witch and that her black cat Smokey has a word and is a grumbler who knows more and more about men.

Here she begins her adventure, trying to understand her powers and how can return to home. Obviously the terrible Whitehead family, who hate witches and magic and who put a bounty on her head, oppose her path.

After a beautiful animated introduction the game starts and puts us immediately in front of some small puzzles to introduce us to the mechanics.
Much of the game takes place in the village of Maepole, but there are other places to visit and explore, accessible via a world map. The characterization of the gaming environments is impressive and contains a considerable amount of secrets to discover and explore.

From the top as in the classics of this genre like the Final Fantasy series for Nes, the control system is a good combination of joystick and keyboard. The first allows the characters to move while the keyboard gives us the opportunity to access the menus.
The latter system allows us to view the status of the characters, the equipment, the objects, the game setting (difficulty), the save and the curious reminder option that gives us access to some "tricks" to remind us how to proceed.

In the menu we will also find the status of Briley and Smokey and the various characters that will be added to the party (we can reach up to a group of 5 people even if the protagonist and her cat will always be present).
Also interesting is the system of sub-quest where we will have to free hidden foxes all over the enchanted world.
The combat system is in turns, as in the classic JRPG of the story (Final Fantasy for example) allowing the group to fight up to six creatures simultaneously.
This gives players time to strategize, using objects and potions during the fight. Since the game is based on novels we will not find the classic D&D monsters. The creatures are made up of credible

opponents of the real world (animal or human).
Even the little Smokey joins the clashes and will acquire, like the other characters, skills as he acquires experience (some like the Double Slash, are fundamental).
The entire game rewards the experience not only through clashes, but also by completing small tasks or quests. For example, a successful delivery. Characters have no levels, all their stats increase at different speeds depending on the experience gained.
There are also several small and simple mini games to add variety to everything. As already mentioned, there are also several secondary missions with varying difficulty (ranging from simple deliveries to this much more elaborate).

Since Briley is a witch, magic is part of this title. The spells are the most varied. From simple healing to powerful attacks with elementals. You can also combine potions. Briley herself gets like any witch who respects a magic grimoire and all her spells are contained within it, with descriptions and the required reagents.
Spells need magic stitches to be cast, each spell consumes different spells depending on their power.
Briley during the adventure can earn and equip several items (even the Smokey cat). Obviously some items are specifically for the witch while others are for Smokey and the other characters.

After this overview of what we find, let's see what we "see".. let's talk about substance!

The game is a colossal job! It takes more than 600 kb and to play it in real hardware we will need some additional "objects" such as an EasyFlash cartridge or the latest update on the Ultimate cartridge (update arrived with version 1.0.2., ndN). Obviously it runs perfectly in emulation on VICE or on C64 mini or Maxi.

The game is sold on the author's itch.ito page (you can find it in the description) at the fantastic price of 9.99 in .crt format.
Technically, we're looking at a piece of jewelry. It is a role-playing game for NES or Master System developed for C64. Animated in a superb way and demonstrates that the little Commodore could (and does) have the opportunity to compete head to head with the great Japanese consoles of the same era if the developers of the time had the knowledge and skill of Mrs. Avory today.
The level of detail shown is, in my eyes, surprising.
Structured floors and walls and decorations, animated fire and highly detailed character portraits.
Speaking of those portraits, how the hell did they do that?

At the top of an impressive technical compartment is a very intricate and sprawling plot that will totally capture you. It is worth noting that while this title is inspired by the JRPG genre and closely follows it by showing a style similar to the most famous titles of the genre, it has a truly British style in the use of dialogues and quests. This thing is a perfect combination, because it mixes two genres often at the antipodes between them.
There's thickness, lots of thickness. There is work and knowledge.
The implementation of the keyboard is also a gem and is very useful for controlling the menu.

The game can be played in several ways. With a speed run that ends in about 7 hours, avoiding a lot of side quests, or in about twenty hours following the whole plot perfectly. In both the ways the game is hilarious and rewarding.

What else to say... We can answer the long-standing question "is this the best role-playing game for C64?". Yes, we are faced with a new way of approaching this type of game and we are faced with a new starting point for this genre on C64.

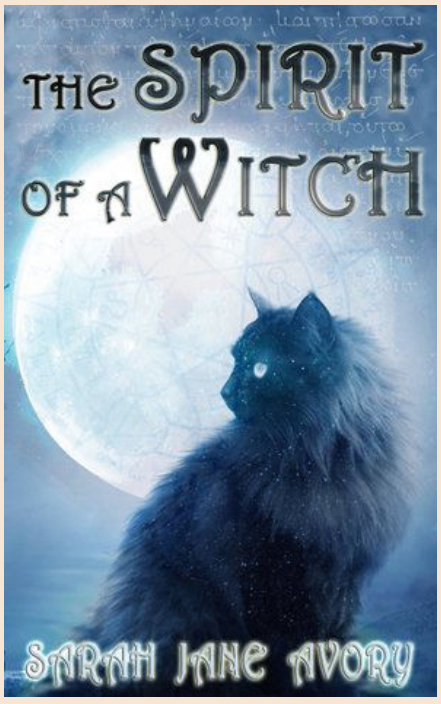
Sales in these weeks have been positive and the author is already at work to continue the saga. We can't test!

by **Carlo N. Del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 98%
Perfect game control system. Simple and easy to use. Nice story and side quests.

» Longevity 95%
20 hours to finish it in a "complete" way, 7 if you want to make a direct speed run... Whatever path you take it will keep you glued to the screen.



The cover of one of Sarah Jane Avory's novels on which the game is based.

COTTON 2: MAGICAL NIGHT DREAMS

Year: 1997
Editor: Tecmo
Developer: Success
Genre: Shoot em up
Platform: Sega Saturn

Halloween... Rays of white light across the screen, flaming scarlet dragons roar from the wand, frozen bright blue enemies bounce off the walls, and in general many things explode and shatter in ways that seem "oh-so-painful but oh-so-cute." This little haunted fairy tale offers many opportunities to use, abuse and master your techniques, all in a world so beautiful that you will blissfully drool all the time...

Sometimes you know something special awaits you. Maybe it's the bright, lively cover. Maybe it's the nice free 12-month calendar packaged inside. In that case, you'd be right: Cotton 2 is really something special.

Yet another excellent Saturn shooter, yet another available only in Japan... but not ordinary in any way. Quite true, the Cotton series is a typical Turbo shooter, full of personality but not overly unusual; however, the episode of Sega Saturn is much more! Since the first game got its fair share of fame, the developer Success immediately began to reassemble a cute, but gloomy, fairytale world.

In Cotton 2, take control of the adorable "Cotton" witch (or, once the game is over, her exuberant rival Appli).

Accompanied by your almost naked fairy friend Silk, who doesn't really do much but yells at you during intervals, you'll float and fight through fog-covered castles, gentle green hills and even the depths of the ocean. No, flying in the water doesn't make any sense, but it looks really great and the little puffy lobsters are incredibly cute! As each level flows through multiple scenario segments, the eyes never tire. Populated with well animated and hand-drawn creatures that seem to come straight out of The Nightmare Before Christmas , the world of Cotton has left me breathless for joy.

Demons who take off their top hat fly around the world, Jack O'Lanterns who vomit vegetables flying in the sky, Venus's flytraps chew on Cotton's broom, and winged demons from hell hurl their pitchforks through the sky's skies. But even if they are demons of hell, they are so elegant that you can't help but want to embrace them! I guess what I'm saying is that the game takes on a dark tone but somehow keeps it carefree and fun. Eyes are just a single sense; it takes more than just living room light games to conjure up a truly magical world!

While the original Cotton used what might best be described as a strange mix of rock/techno/pop, this version takes a more synth-classical approach to the soundtrack. This translates into melodies that demonstrate an incredible wealth of themes, but still contemporary in nature. Maybe the best part is that the music never repeats. The levels are long, but the musical tracks are even longer.

Unfortunately, you can't play the songs directly from the CD and there is no music test mode to unlock... In all seriousness, from the introductory theme, to the final theme, passing

PLEASE WAIT
PRESS START BUTTON
CREDITS 8
Once again the young witch Cotton sets out for adventure to get magical candy called Willow

through the music in the options menu, it's a magical experience like no other. But in today's world, everyone knows that sweet images and sounds alone, although important, are not enough to create a truly exceptional shooter.
The thing that stands out in Cotton 2, and I mean it really stands out from all the aspiring Rtype-Thunderforce-Gradius, is the engaging gameplay.

The depth of the technique involved here simply drowns the competition.
Cotton may have "only" five different weapons, but the depth of this game lies in the way those weapons are used. Let's start digging. Not only can you tap the A button for a quick dose of eye-pleasing pain, but you can also perform special attacks! Double tap and fire: drop a rolling bomb. Press back and then forward for a concentrated explosion of blazing fire, impetuous wind or so on. Back and forth? A diffused shot in Contra style, whether it's a multitude of light rays or ice splinters. And that's just scratching the surface.

Now let's dig a little deeper. Not content to carry a single weapon at a time, Cotton carries an escort of up to three. Why is that? Press C to unleash your currently brandished weapon in a single ultimate attack: crimson red dragons, gigantic glowing rays, huge tornadoes, or ice storms filled with fragments. So, you have two weapons left. Fortunately, replacements are plentiful (as well as upgrades to increase your basic shooting power).

Is that it? Of course not! Dig deep and you will discover a source of creativity. See, even if he looks like a shooter, he thinks Cotton 2 is a platformer! As you make your way through each level, you can actually grab and launch enemies at the push of a button. If you touch the button repeatedly, you can beat your enemies to death with the bodies of their friends! Tired of dodging the pitchforks that are thrown at you by the infernal demons? Just take the pitchforks in midair and throw them back at them! In addition, you can actually tear the heads off the dragons and throw the cute and confused pumpkins against the decapitated bodies. Now, if this isn't nice, I don't know what is. Forgive my exuberance, but this game is exactly this: exuberant! It's really very easy to learn and learn, but it's abnormally deep and crazy fast and... well... fun!

I'd be remiss if I didn't mention chain combos. When you hit an enemy with a powerful shot, it remains trapped in a sphere of energy. For example, you hit something with a stream of fire and it becomes a ball of fire. You can then pick up the fireball and throw it! As it bounces off enemies, it accumulates "chain strokes" (and sometimes even sets fire to those enemies!).
Since innovative controls make this game completely different from the competition, anyone who expects to play "a nice Gradius" will die quickly and miserably.
Almost no enemy in this game can be killed with a single shot (normal). You need to use your special attacks. Cotton herself is pretty big, which makes it hard to dodge everything on screen.
You need to use the grab and combo chains feature to protect yourself.

If you're a fan of platformers and shooters, then this little witch tale offers plenty of opportunities to use, abuse and master your techniques, all in a world so beautiful that you'll blissfully drool all the time. It may not be the best game of all time, but Cotton 2 is unique and worth every shiny penny.
Try it on a real Saturn or emulation... it's worth it!

by **Ingrid Poggiali**

OUR FINAL SCORE

» Gameplay 95%
Rich in combinations, special weapons, bonuses, visual effects. You will never get tired of it.

» Longevity 90%
Not easy to play but it's beautiful, absurdly beautiful!

NEW GAME

DRAGONBORNE

Year: 2021
Editor Spacebot Interactive
Genre: ARPG
Platform: Game Boy
Website: https://www.spacebot-interactive.com/product-page/dragonborne-physical-english-version

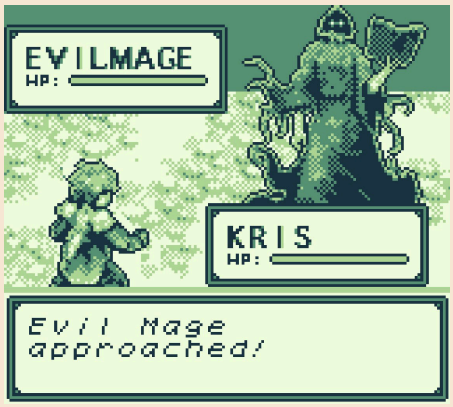
The Game Boy would not have been the very first portable system with interchangeable games, this honor probably goes to the Microvision that precedes the GB of 10 years, but it has certainly been by far one of the most influential. Still today there are those who love the old gray brick of Nintendo, so much so they can do everything through its directional cross and its two buttons.
Just think of Kenobit, alias of Fabio Bortolotti, who uses it to make music and does it really well.
There are also those who develop new games and do so in a very optimal way.

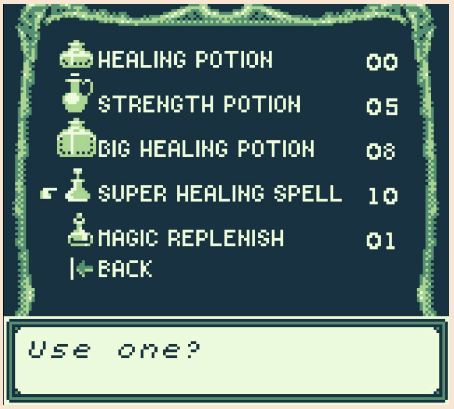
Dragonborne is one of these new titles for the small handheld, which received a physical version on a cartridge and a digital one on its new release.
But how does it work nowadays a game designed for an already underpowered hardware in 1989?
The story of the game opens with the disappearance of the protagonist's father and the Dragontooth bandits who attack the village. At this point it will be up to us to dress up as the hero, clean up the village and find out where our father has gone.
Our main character is a boy with a special connection to the mythical dragon people.
Normally a cliché plot like this would be negative nowadays, but Dragonborne is an intentionally retro born game and GB games were not known for their deep and complicated plots.
At least the game has a slightly more complex story than the norm, but it still manages to capture the atmosphere.
The fantasy world of the game is the typical one and the style is exploration seen in other titles of the genre Action Rpg, perhaps nothing innovative at first impact but each area of the game demonstrates a depth of action and a plot able to glue us to the screen of the small laptop.

The presentation of the game is good. Simple but impactful title screen. The graphics are composed with the canonical 4 shades of green and resemble the Final Fantasy graphics for characterization and cleanliness during the game. In fact, to be honest, the sprites are very inspired by the soft Square series and it can only be a good thing.

The combat system looks more like the original Pokémon series, with our character on the left side of the screen, while a large and impressive enemy sprite occupies the right side. Very detailed enemies that make the clashes pleasant to look at.

The sound section does not shine in the music scene of the games for this console. The music is pleasant but repetitive and the sound effects are very functional. Overall above average but you could do a little bit more.
Dragonborne might seem like a typical console role-playing game of the time. Cities to visit, enemies to fight, puzzles





to solve and so on. All the usual things. But the fundamental aspect of gdr, the level growth, is missing.
You do not gain experience by defeating enemies or level up.

It's actually more like an adventure game than a traditional JRPG, but with a turn-based combat system. As we progress through the game we will gain new items that are critical to overcoming obstacles and will have to solve some simple puzzles.
The puzzles themselves are the simplest type and it is understandable if you think about the hardware on which this game runs. Many boil down to simple puzzles with block movement or multiple trial and error style puzzles. Interesting the implementation of the exchange of objects with some non-playing characters in the game. This allows our character to commit to redeeming some objects that are crucial to the success of his search.

Concluding thoughts.
Dragonborne is a pleasant adventure game developed with two things in mind: the native hardware and the type of player.
It is not as complicated as some games of the same genre but at the same time becomes enjoyable to explore.
I liked the simple game system and the graphic search, slightly less the sound but it is not decisive.

If you have a Gb you can not not order on the site this little jewel.

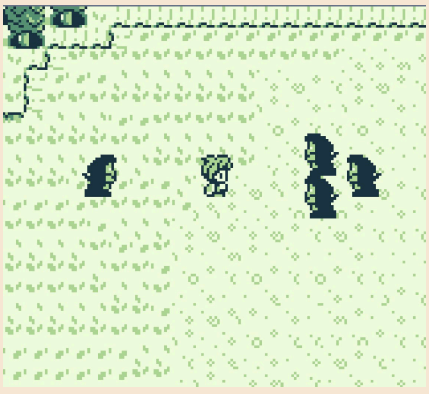
P.S. The game is available (with the same graphic setting) also in PC format. You can find it on Steam.

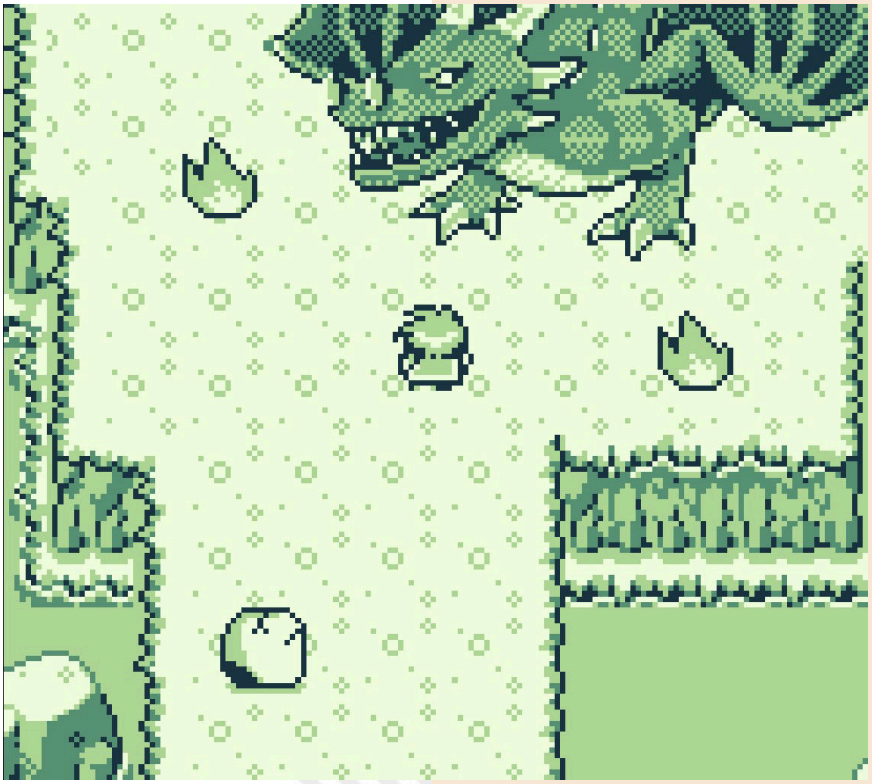
by **Ingrid Poggiali**

OUR FINAL SCORE

» Gameplay 85%
Simple but effective control system. Excellent for this type of console.

» Longevity 75%
Not difficult but fully in line with the genre of the game to which it belongs.





NEW GAME

UNMETAL

Year: 2021
Developer: UnEpic Fran
Genre: Stealth Games
Platform: Windows, Playstation Vita, Ps4 and Nintendo Switch
Website: https://www.epicgames.com/store/it/p/unmetal

Sneaky, funny and just a little, annoying!

It's very rare to find a comedy game that really makes you laugh. Comedy is often a subjective genre, which is why comedy films have this tendency not to be correctly reviewed in the magazines.

On the one hand, what makes them difficult is the average between the comedy of the film and your sense of humor and whether this combination will entertain you.

This is where UnMetal comes in. A parody game based on the original games of Metal Gear on MSX that also combines different points of pop culture, movies like Tropic Thunder and Hot Shot and really incredible moments that will leave us bent by laughter.

UnMetal is an action/stealth game that puts us in the shoes of Jasse Fox, a random civilian who has to escape from a military prison after being arrested for a crime he didn't commit. As he moves through the prison he encounters other characters and is involved in some kind of plot to start World War III and, heroically, must do his best to save the world.

All this using a combination of crazy stealth skills and pure stupid luck, facing numerous bosses, mutated creatures and soldiers of all kinds and genres.

If there was ever a series of games she had to take less seriously, it was

the Metal Gear series. Although it was written as if the author was a 12-year-old conspiracy theorist in acid, Hideo Kojima's most famous series was treated with an air of exaggerated seriousness. UnMetal brings up something where many parody games fail. It actually manages to be a fun game to play, clearly taking the original game for the backgrounds without ever neglecting the stealth moments so dear to the Konami series.

Paradoxical situations and moments at McGiver aside, UnMetal is not an easy game. He'll keep us busy between

laughs to make poor Jasse live. Knowing how to use the recovered items at the right time and with the correct timing to move forward in the game will become essential.

The gameplay works really well with the plot and the humorous dialogues. It's fun to understand the sneaky scenarios and puzzles while non-sense dialogues will ease the tension to solve the puzzles (memorable description of the moat before the challenge with the grenade man).

The entire game takes place in flashback, while the hero tells his story. While he remembers things or invents them in a healthy way, the gameplay changes. There are even completely hidden areas that can only be “remembered” by completing object puzzles from other parts of the layer. This can affect everything and change the course of the game.

The game has a very strange feeling of "Trolling", with some choices that seem to work but then eventually do not work, ruining the long-term plans. In almost all cases, this strange feeling does not lead to devastating consequences even if it leaves us baseless and confused.

The game system is correct although a reconfiguration of the control keys is preferable to avoid chaos on the joypad.

Technically it is a tribute to Metal Gear with well made retro graphics and a large sound compartment.

The Fox dubber, or the "Bat Dad" of youtube, is memorable. Definitely trash but effective.

In conclusion, if you are looking for a different, irreverent and "particular" game, UnMetal deserves to be installed on your devices.

by **Carlo N. Del Mar Pirazzini**

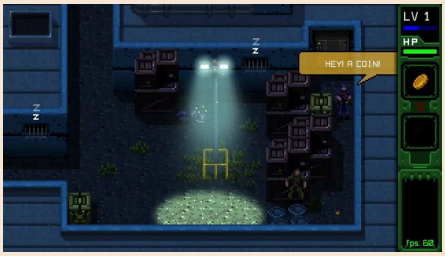
OUR FINAL SCORE

» Gameplay 85%

Nice game dynamics and simple, fun stealth gameplay.

» Longevity 80%

Some bosses are pretty tough and certain non-sense moments will have you asking "why?".



NEW GAME

THE SWARM IS COMING

Year: 2021
Developer: Minilop
Genre: Action
Platform: ZX Spectrum 48k and 128K
Website: https://minilop.itch.io/swarm

Next B, year 2122. Planet colonized for the purpose of extracting a material called Proximium.
Scientists have discovered that Proxium has a unique characteristic. Allows distortion of the space/time continuum.

Experiments with this rare material have been successful in allowing teleportation to move non-living objects through space/time in a matter of seconds.
Scientists working on the alpha lunar base are also working to improve the ZX MAT, a change that will also allow living forms to move quickly between dimensions and time.
But something goes wrong and the xenomorphic catastrophe pours into the base.
We'll play the role of Brenner, an engineer who works at Alpha Base. We will have the task of exploring and understanding how to annihilate the alien threat.

What a beautiful game! Frenzied, with well-balanced difficulty and well-developed. A title that mixes the elements of action of Alien Breed (which is inspired by the view from above) with elements of exploration and logic that remind us of the classic Space Hulk Tactical.

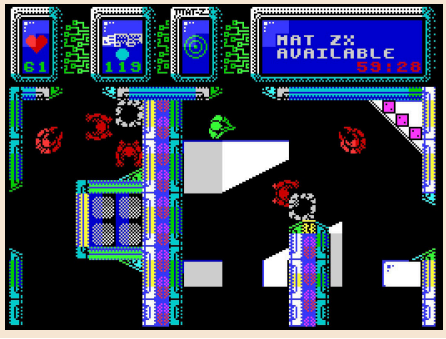
The game is divided into 4 mission files available in 128k and 48k versions. To these four files is added the training mission that I strongly advise you to try first to understand the game

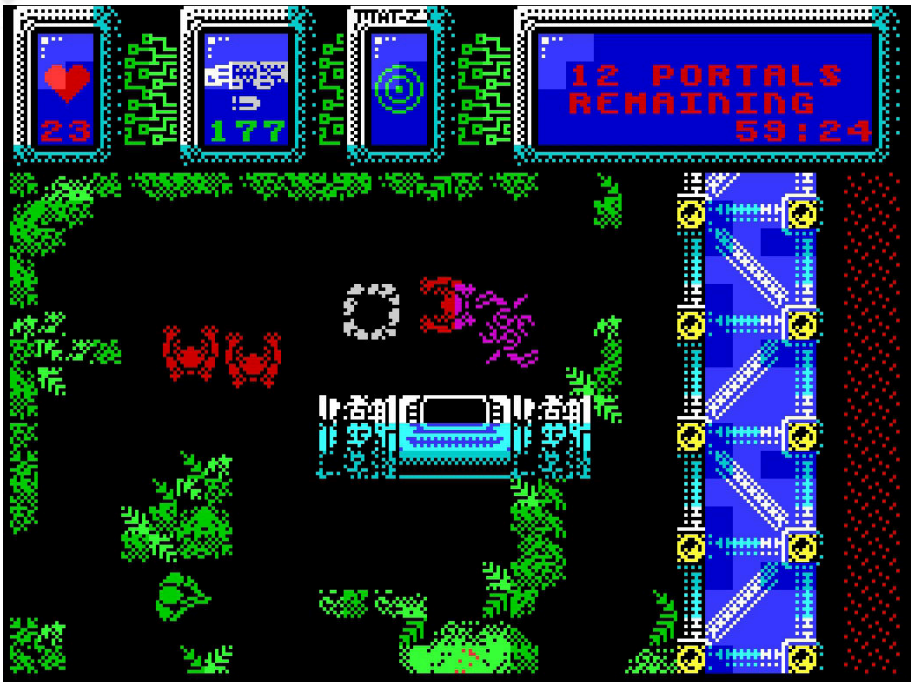
mechanics and controls.
Missions 2,3 and 4 require access codes that will only be granted by successfully completing the previous mission. The good thing is that there are multiple codes and they are generated based on the progress of the game, the difficulty of the game and the performance in the game itself.

This makes the title really very varied and will allow us to approach the game in different ways.

Graphically well detailed and easy to understand. It moves well and has no particular graphic glitches or slowdowns. A clean job.
In the 128k version the soundtrack is present and is rather disturbing, in the 48k version we have some basic sound effects but still well made.

The control system supports Kemston and Sinclair joysticks, but I much





OUR FINAL SCORE

» Gameplay 90%

Customizable control system with both keyboard and joystick. Simple to play and well developed.

» Longevity 95%

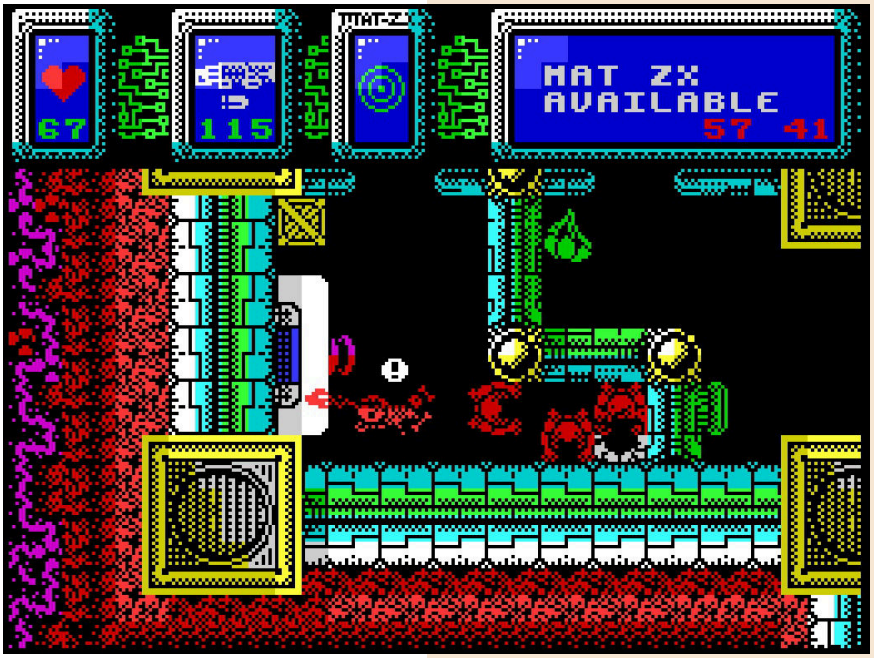
Huge game. Various maps, great variety of fights and opponents to blast. Not only is it reminiscent of the aforementioned Alien Breed or Space Hulk, but it is as frantic as a Doom with a top-down view.

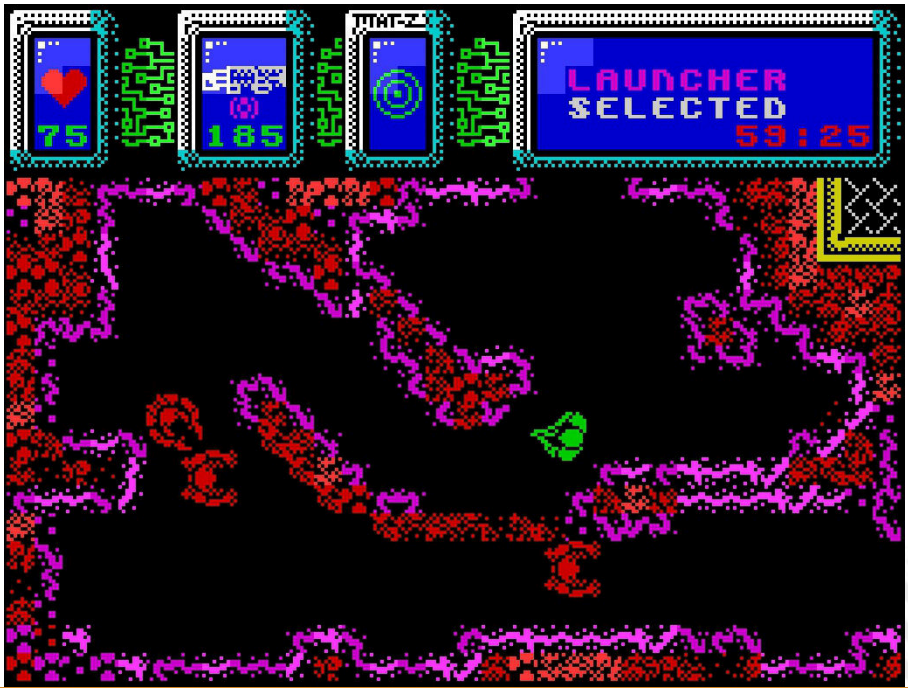
preferred to play with the keyboard, customizing it to my liking given the amount of controls we can use during the game.

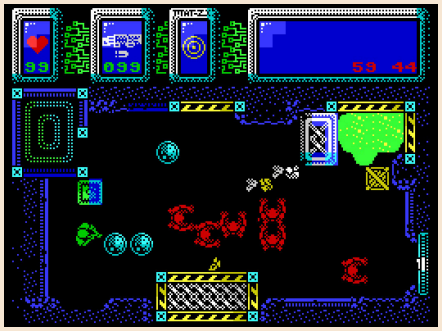
The title is available on the itch.io platform for only £2.99 and occupies 1 mb.
It works correctly on the main ZX Spectrum emulators.

Don't miss it. Blasting xenomorphs is always a priceless satisfaction on our 8-bit machines.

by **Carlo N. Del Mar Pirazzini**







EMPIRE EARTH

Year: 2001
Developer: Stainless Steel Studios
Music: Ed Lima, Steve Maitland
Editor: Sierra on-line (Sierra Entertainment)
Genre: Real Time Strategy
Platform: PC

In 1997, a young team of developers, Ensemble Studios, published Age of Empires, the first of a successful series that will soon be acquired by Microsoft.

Rick Goodman, producer of the series, began working on a more ambitious project, and in 2001 Sierra Entertainment (at the time Sierra on-line) published Empire Earth.

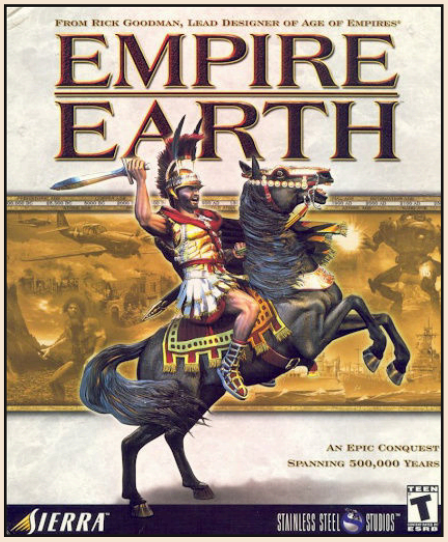
This title has many features in common with Age of Empires, adding others from the Civilization series, namely boundaries and all historical eras.

The graphics have also been significantly improved compared to Age of Empires, presenting themselves entirely in 3D, with more detailed models and a terrain that this time presents more defined hills and mountains.

An unfavorable note goes to the artificial intelligence a little lacking, which is compensated by providing bonuses to opponents controlled by AI, but this does not affect the game experience. There is also a multiplayer mode.

The history mode is divided between various historical periods, imagining also a hypothetical future, starting from ancient Greece up to a futuristic Russia.
The various campaigns are disconnected from each other and each one follows its own plot that takes up the main historical events (excluding the Russian campaign, totally imaginary).

The expansion "The Art of Conquest", developed by Mad Doc Software, adds a new era, the space age, revealing only a change of textures and models, with the only innovations represented by new units and campaigns, the latter are a Roman, a peaceful one and an Asian. Units are also assigned special abilities.



The game editor has been structured differently from usual, it is in fact divided into two sections, one for the creation of civilizations and one for maps. A useful division for those interested in modding .

In general, the title is presented as a successful experiment, merging

elements from different titles in the right way, also winning the "Game of the Year" award in 2001.

The music is very nice and iconic.

A good title, highly recommended especially if you are passionate about old-fashioned strategy games, but also if you are looking for something different from the usual. Can be found at a very low price in Gold edition on GoG.com

by **Maurizio Aaron Diamanti**

OUR FINAL SCORE

» Gameplay 70%

The game offers a good campaign, expanded by the expansion, and skirmish, as well as an unfailing multiplayer mode. The AI, while not really affecting the gameplay experience, remains a bit lacking.

» Longevity 80%

The campaign provides about twenty hours of play, but the skirmish, multiplayer, as well as playable civilizations and the expansion pack, provide good replay value.

NEW GAME

INCA MAN

Year: 2021
Editor: Amiten Games
Genre: Platform
Platform: Amiga
Website: https://amiten.itch.io/inca-man

A year really full of new releases for Amiga this 2021. Lots of developers have set our Amiga on fire often creating masterpieces, other times giving us pleasant games.

Inca Man is a fixed-screen platform where the main purpose is to retrieve as many diamonds as possible without being killed by terrible creatures from the tombs and then access the next stage.
Our protagonist is unarmed and can only jump from one platform to another, occasionally collecting some bonus items.

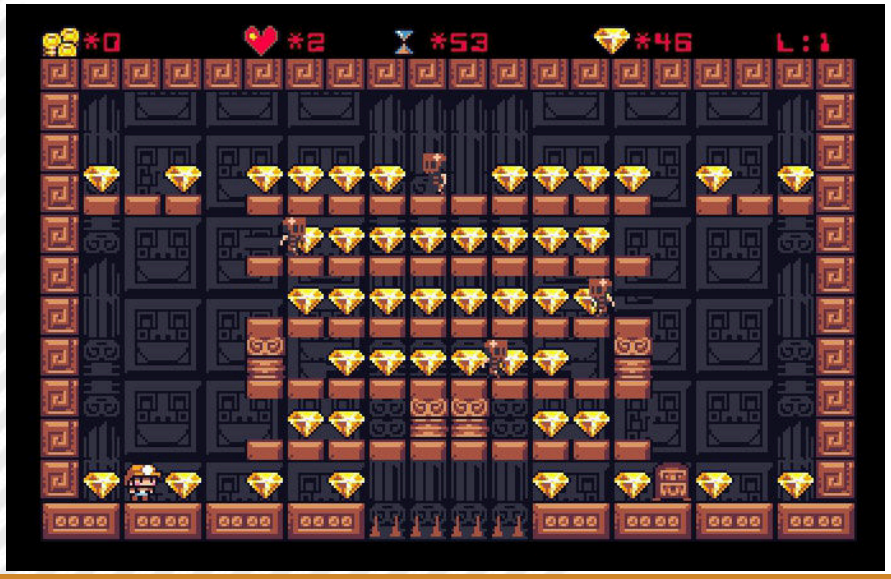
Timing and concentration make a difference in order to survive in the succession of levels.
The game resides in a simple ADF file and runs on any Amiga with at least 1 mb of Ram (OCS, ECS, AGA). It also works well in emulation.
It features 30 levels with increasing difficulty, a classic single-player mode and the ability to double play both cooperatively and in the much more fun VERSUS way (stealing diamonds will ruin friendship... you are warned!).

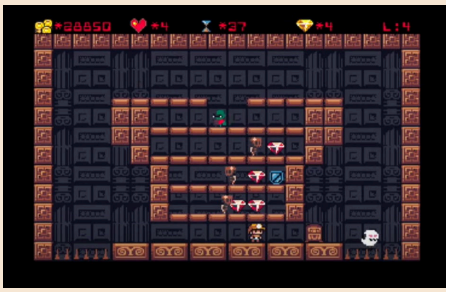
It is a product that can be downloaded from the site that I have put in the description and it is a "free offer".
Graphically it is very pleasant and very "classic". Beautiful colors and cute animations.

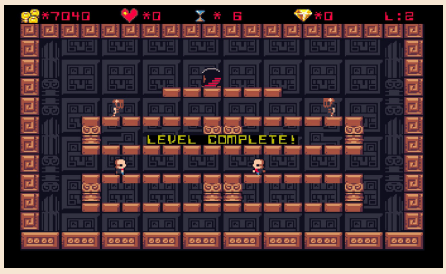
Even the music is what is expected from the titles of this genre.
Simple to play and quite long-lived, but maybe the mechanics after a while are repetitive and tiring.
It reminded me a lot of King's Valley for mode and setting (a nice platform released for MSX, Commodore 64 and also on Amiga).

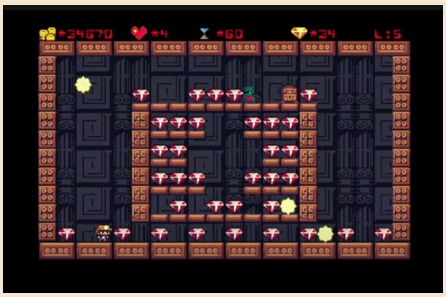
In short, a pleasant game without praise or blame that deserves to be put in our Amiga collection.

by **Carlo N. Del Mar Pirazzini**









OUR FINAL SCORE

» Gameplay 75%
Easy to master and to play.

» Longevity 70%
Gradually increasing in difficulty but very monotonous over time.

NEW GAME

PRINCE OF PERSIA

Year: 2021
Developer: Rensoup
Genre: Action/Platform
Platform: Atari XL/XE
Website: https://atariage.com/forums/topic/298914-unicorns-season-prince-of-persia-for-the-a8/#comments

Wonderful conversion!
The long-awaited porting of the classic 1989 platform by Jordan Mechner Prince of Persia arrived a few hours ago (I am writing at 22 and 25 on October 24, 2021, exit day) on the Atari 8bit.

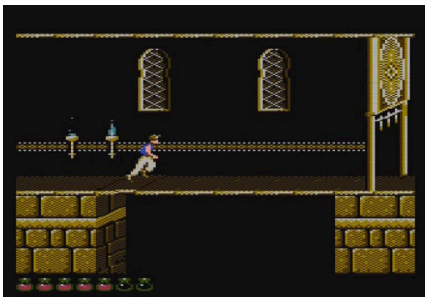
The other "retro" platforms were fortunate to receive the game's porting, including the C64 and the micro BBC, but it seemed out of reach for Atari's computer system first launched in 1979.

However, this did not stop the AtariAge guys from facing the challenge.

With the additional help of other developers always on the forum of AtariAge, Rensoup (the developer) has produced something surprising and for the undersigned, after a day of testing and intensive gameplay, is one of the best versions of the game so far. Personally, I think the art style goes beyond just the original version for Apple II, but also the 16-bit computer versions.

The game took years of work, but it was worth it.
Developed based on Jordan Mechner's original code and Bitshifters' BBC micro conversion, the game has been developed to the full potential of the machine. It runs on 128k systems or on machines with memory expansions. From the site we can download different versions: 2 SD, 1 DD or Megacart.

Graphically, it's a jewel. Nice to see, fluid, perfectly animated. The fights are perfect, a real good job!



The game is all condensed on those files. There really is everything. The incredible playability of the title that it carries with it since its first release. The degree of challenge is present.

Who could have expected it from an 8bit system born in the late 1970s. This makes us understand that retro systems when exploited with current technical knowledge, are eternal machines.

Run to download it and play with it.
The game obviously runs on real hardware, but if you want you can also test it in emulation with Altirra. In both cases it is an experience to be had.

by **Carlo Nithaiah Del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 95%
It was a masterpiece when it came out and remains the same even in this version that technically is the most enjoyable ever.

» Longevity 90%
It's Prince of Persia. The degree of challenge that pleases us old retrogamers of yesteryear.

LUFIA & THE FORTRESS OF DOOM

Year: 1993
Editor: Taito/Neverland
Genre: JRPG
Platform: Super Nintendo

Let's take a look at another hidden RPG gem on Super Nintendo.
The release of Final Fantasy II (Final Fantasy IV) led to an increase in popularity for console role-playing games in the United States and Europe, especially for Japanese titles.
Among the games in his wake of the Square Enix saga was Lufia & The Fortress of Doom, the debut title of Japanese developer Neverland and published by Taito.

The series continues with three successive titles: a prequel to SNES, Lufia II: The Rise of the Sinistrals; a sequel to Game Boy Color, Lufia: The Legend Returns; and a secondary story on Game Boy Advance – Lufia: The Ruins of Lore.

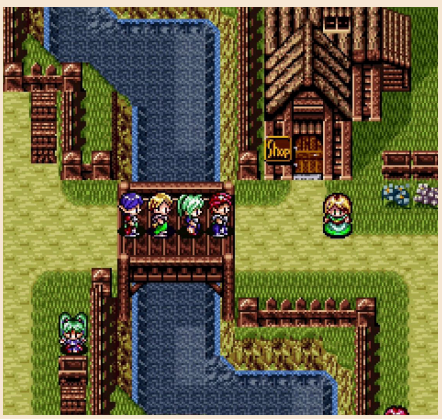
Seven years after the release of this last episode, the series received new life in the form of a remake. Lufia II was rebuilt for Nintendo DS as Lufia: Curse of the Sinistrals, an action role-playing game that tells a modified version of the original game's story.

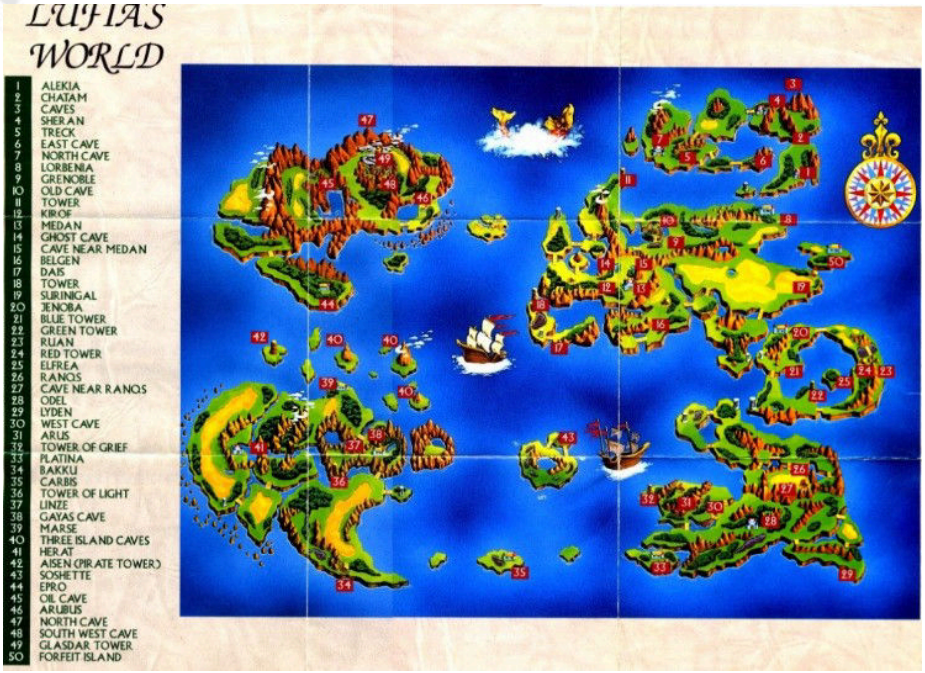
In Japan, the series is known as "Estpolis Denki" ("Record of Estpolis"). In the rest of the world the series takes its name from one of the main characters of the first game. Although Lufia herself is absent from all subsequent games, the title remained. It also features a group of enemies as recurring antagonists throughout the series: the Sinistrals ("kyoushin" or "mad gods" in the Japanese version), four beings of evil forces who regularly threaten the Earth and must be repelled by a band of heroes every time. They seem conceptually inspired by the Four Knights of Revelation from the Book of Revelation, although none of their designs or powers have been taken from them.

Lufia and The Fortress of Doom begins by depicting the first band of heroes, Guy, Maxim, Selan (Serena in Japanese) and Artea (Arty in Japanese) facing the Sinistrals. In these brief moments it turns out that Maxim and Selan are in love and that they have had a child. The heroes defeat the Sinistrals and while Guy and Artea manage to escape with a teleportation spell, Maxim and Selan fail to escape and die. 100 years later, the Sinistrals return and it's up to a new generation of heroes to defeat them once again.
Lufia remembers a simpler version of Final Fantasy IV .

Where FFIV keeps the player on edge with its Active Time Battle system, Lufia slowly builds a party of four characters and they stay with you for the entire game. The casters overlap heavily on some types of spells (especially basic healing spells).
The battle command interface is on a five tile cross that corresponds to the directional pad, making it a little different from the norm.

Graphically, the game does not shine with absolute peaks. Battles are set up similarly to Dragon Quest, with static images of enemies lined up in the center of the screen. The sprites of all the main characters appear at the bottom next to their status windows and carry out assorted attacks. It makes the fight a little more visually appealing. There are very few different





tilesets for the various dungeons and cities, so a dungeon will be visually identical, in terms of tiles and colors, to the next dungeon.

Characters have a rigid level progression path, with no choice as to what powers they get, what attribute bonuses they get, or anything else. Instead, any customization of your group members is done through the objects. In addition to standard weapons and armor, there are accessories that can provide attribute enhancement, increase the power of certain spells, or increase damage against certain types of enemies.

However, in several dungeons of the game you can get cursed objects, an idea of the original Dungeons and Dragons and adopted by Dragon Quest. Cursed items cannot be unequipped and can drain the health of the character carrying them. Only by going to a shrine can you remove the item so it can be sold. There are also expendable items that will permanently increase HP or MP of a character or one of their attributes. There is also an optional subquest involving the collection of dragon eggs scattered around the world and the exchange of these will guarantee extra bonuses.

The game was also scheduled to be converted to Sega megadrive between '94 and' 95, cancelled at the last moment due to the generational jump between the 16-bits era and the next.

In conclusion, it is not a perfect game, but a pleasant one. Maybe not the best of its kind on the Nintendo 16-bit platform, but it will give you a few hours of fun.

I especially loved the pathos of history and some choices like the cursed objects needed in some game points.
To be tried.

by **Roberto del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 70%
Very linear game system and not too customizable, but interesting in some aspects.

» Longevity 70%
The additional quest gives a few more hours, you'll play it in one go until the end and then store it in your collection... and that's it.

NEW GAME

MAGIC CASTLE

Year: 2020/21
Developer: Team Kaiga
Genre: ARPG
Platform: Playstation

One of the most interesting things that Sony did with the first Playstation was to release NET YAROZE, a consumer-level game development kit, aimed at students and amateurs who wanted to get into the production of titles.
Even if the games produced were not at the level of those of the big houses, some were developed really well.
Among the titles that we remember developed with this kit we remember Devil Dice.
A title of NET YAROZE that unfortunately never saw the light of day at the time of its development was the role-playing game that we present in this review: Magic Castle. Developed mainly at the end of the 90s (1997) it was overshadowed due to the lack of a publisher for publication.
However, the same Kaiga Team developers went ahead and released (very calmly) a fully playable version at the beginning of this 2021 (we also talk about it on our youtube channel in a mini video review).
Admittedly we are looking at a new title for PS1.
At first glance it seems quite simple: we will cross random dungeons, choosing a character chosen from different classes (Knight, Wizard, Archer and Warrior). The main objective is to reach the 20th floor of the castle, where an evil sorcerer awaits us.
But as we climb the various floors, our level will increase and we will find new objects, spells and equipment that will make our lives “easier”.
One aspect of the game is the ability to control the camera with the right analog stick; something that was not common at the time.

The graphic style is pleasant, with still today appreciable cell shading and nice animations.
Beautiful soundtrack that changes dynamically depending on the game environment, another anomalous feature in an "independent" game.
Initially we will be really weak and we will have to be very careful during the clashes and in equipping the character at its best.

Several hidden areas are present and will thank us by donating some essential items for the success of our quest.
A quick tip: for beginners I would recommend the use of the archer. The other characters are manageable once properly upgraded, but from the beginning to go far, it is advisable to have a weapon at a distance.

To mention one of the most interesting features of the game; cooperation.
We can play up to four players and this makes everything very fun and competitive.
Even fighting the hordes of enemies in four becomes less unnerving and frustrating than, of course, single.
The only flaw in the multiplayer session is that when our character dies... he dies permanently! There's no chance of bringing him back to life. We must wait until the end of the session. Limiting.
Another point is precisely the level of difficulty. It is not an easy game, although it may appear.
Some levels are impossible without proper character management. Some monsters are real exterminators and we find them right away.

The game is freely downloadable from the developers site (you can reach it by searching on your favorite search engine), but if you want to support the developers you can buy the soundtrack in digital format or CD.

Magic Castle is a good title, perhaps not really suitable for the casual gamer and more specific for those who want something stronger.

by **Carlo Nithaiah Del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 85%
In four is a lot of fun. Nice game system and camera support.

» Longevity 60%
Nice to play but not to be underestimated. Some points are really hard.

QUEST FORGE:
BY ORDER OF KINGS

Year: 2015
Editor: PIKO Interactive/ Ludosity
Genre: RPG
PLatform: Nintendo NES
Website: https://pikointeractive.com/new-soft-release-quest-forge-for-nes/

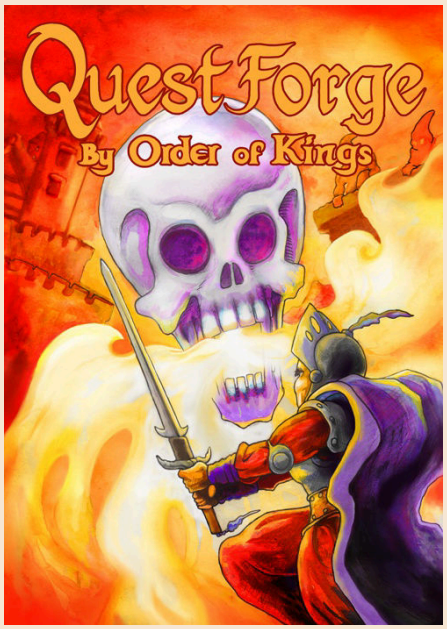
The Nintendo NES is a small "venerable" console. Launched back in 1983 in Japan (in its version called Famicom) it has made so much break into the hearts of so many players that it makes it eternal.

Like for the C64, the market of "homebrew" and independent games is alive and kicking with annually developed titles of excellent quality. Not to mention the hack roms and reprints of the classic titles up to the phenomenal NES MAKER that allows us to create an 8-bit game from scratch.

Among these developers are Ludosity, who produced this Quest Forge: from Order of King in 2015. The game is available both on physical cartridge with gadgets, manual and much more, and in digital download.
As Sir Nils, one of the knights of Axvald's castle will have to help the king on a dangerous mission, free the gate of our world from a terrifying demon and clean it from the dangerous creatures that have entered because of him. During the quest Sir Nils will be able to obtain eight enchanted artifacts that will increase the various Skills, helping the hero in his adventure.

The player will, of course, control the knight. Exploring the map reminds us of the great classic NINTENDO "the LEGEND OF ZELDA" but the turn-based combat system is inspired by the SECRET OF MANA where we will have to carefully play our stats and timing.

If the player manages to defeat the enemy before his HP reaches zero, he will gain experience. If HP reaches zero before the opponent's defeat, the player is defeated and loses 1 heart/wound. It will always be possible to challenge the same enemy immediately, with the interruption of



OUR FINAL SCORE

» Gameplay 90%
A different control system that excites and makes you think.

» Longevity 90%
9 Worlds to explore.
I guess that's enough.

the enemy's HP since the previous challenge ended.
Once you have earned 50PX, the player will be able to improve the following features:
S. Speed needed to start the first round of combat
V. Vitality, increases health during the clash
P. Power, increase the damage of our weapon
W. Weapon, show the current weapon by upgrading it.

As these abilities increase, you will notice that our opponents' PX will be less and less and it will therefore be more difficult to raise our characteristics. The player can press the "A" button during the collision when in contact with the enemy to fill the power meter. The higher the counter at the start of the fight, the more damage Nils will do.

The controls are those of the standard NES.
Movement with the directional cross.
A – The player makes a sword appear with a flashing meter. You can press it the moment you come into contact with the enemy.
B – We will use the Super Shield but it has a physical duration (it is consumed).
Select – We will scroll through the stats when you level up.
Start – Select a statistic to update and confirm.

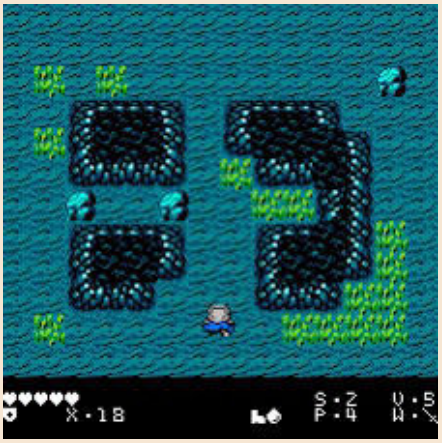
Quest Forge reminds us a bit of the classic Zelda and the aforementioned Mana, but I also found similarities with the Ultima series and I particularly liked this one.

There are 9 levels to explore and many hidden objects to recover.
Technically it is minimalist but effective. The graphics on Nes in this genre of games is certainly superior in many cases, but here it performs its function, as well as the audio department.

The strength of the title is the gameplay thanks to the particular control system that requires attention and stimulates different approaches to clashes from the classic "attack, press the button, massacre, take the coin".

I really enjoyed this approach system. The maps are really big and the game is really huge.
Maybe a little monotonous monsters, but it doesn't affect much.
A nice product that I recommend you recover.

by **Carlo N. Del Mar Pirazzini**



NEW GAME

PUZZLE BOBBLE

Year: 2021
Developer: Collettivo CRAZY PIRI
Genre: Puzzle game
Platform: Amstrad CPC
Website: https://crazypiri.itch.io/puzzle-bobble

The month of October has given us several interesting titles. After the magnificent Prince of Persia for Atari 8bit, on the same day (October 24), was released the port of Puzzle Bobble for the Amstrad 8Bit.

Puzzle Bobble is an iconic mid/late 90s game. A small token-eating machine that deployed the stars of the legendary Bubble Bobble in a totally different size than the original platform.
It was a unique success.

This version features 100 levels set as in the arcade version, the backdrops are a repetition of 7 screens of which 6 of these are a tribute to the iconic Taito titles. We will find the picture of

Bubble Bobble, Parasol Star, Chase HQ, Arkanoid and New Zealand Story with their respective soundtracks.

The work done by the Crazy Piri team is remarkable. Colorful and well-animated graphics and a respectable sound sector.

Compared to the arcade version, the pointer is missing but the track of the path that follows the sphere has been maintained, useful for newbies (less for a pro gamers).

Unfortunately the two player mode is missing, which greatly increases the overall longevity of the game.

I really liked the innovative method of recording your scores online through the QR code generated by the game itself at the end of the game. The code can be sent to developers.

In conclusion, I can only advise you to quickly download this jewel in .dsk format and test it on your machines or in emulation.

by **Carlo Nithaiah Del Mar Pirazzini**

OUR FINAL SCORE

» Gameplay 85%
It's Puzzle Bobble, one of the most playable puzzle games in history.

» Longevity 75%
Too bad the lack of a two-player version, which really lowers the interest threshold after a while. I also found some of the stylistic choices in the levels repetitive. But full sufficiency.

STREET WARRIORS

Year: 1989
Publisher: Silverbird
Genre: Beat 'em up
Platform: Commodore 64

New year according to the Celts, new winter on the doorstep and finally it is returning to life after almost two years of restrictions and limitations of real life. Yes, because we at Retromagazine are going forward in a fluid and systematic way to write articles and reviews because our magazine is not only beautiful but it is also immune! I feel in the air that this will be a Christmas full of novelty also from the video game point of view. On my end I bought a Commodore 64 with some tapes, after decades that I was without, as I made the mistake to sell it when I was younger.

However, let's move on to the classic sliding beatings I played, observed and finished with little effort: Street Warriors is one of the many sliding beatings released for home computers where you play the role of the hero facing by yourself the local town gang within various locations and at the end you reach the final clash with the boss or leader of the gang leaders. We will begin our retraining course in a cemetery not infested with ghosts or zombies, but by some members of the gang, who are distinguished by the color of the dress, the beard, the bald etc.
We will have a bag of bare-handed moves at our disposal, plus a bar that can be retrieved from enemies fallen to the ground from the second level. At the end of each level there is a store where you can buy, thanks to the credits dropped by the defeated enemies, additional energy (if you lost it during the level), extra time (it will be useful because we have a limited time to complete the entire game not renewed between one level and another) and... a bomb. Why do we need a bomb in this game? Isn't it enough to kick, punch, and bar against little thugs? No, it isn't! If you do not buy the bomb, you will not be able to access the last level and the result will be a sad game over!
Speaking about graphics, I was not disappointed. I used to have very little expectations from a game not passed under the spotlight, while the sound is in the beaten style with no sound effects.

The gameplay of the genre is now very well known: there are those who want to commit themselves to the maximum reaching the end of the game by trying all the available moves, inventing the combos, and those who are in a hurry to see the end simply using the infallible single-move as often happened in this genre of games.

Longevity is proportional to the difficulty and time available; five levels may seem few but in reality they will seem many if you put the right effort into it. In addition, as I said above, you will not be able to access the last level if you do not buy the bomb necessary to blow up the headquarters of the gang at the end of the game.

The tips and guides that I feel to give you when you load it are first of all to arm yourself with patience, try all the available combinations to take confidence, collect the credits dropped by the defeated enemies and when you visit the store at the end of every level, buy the infamous bomb as soon as possible. Lastly, I can reveal a little secret that will perhaps give you some relief: in the last level, there are no enemies to beat, but only the boss who will just throw bottles at you for all the sliding of the level and once you arrive in front of him... End of the little secret! A happy and relaxing winter to you all with your beloved Breadbins!
by **Daniele Brahimi**

OUR FINAL SCORE

» Gameplay 45%
A little boring and not hard to get to the end if you find the right move.

» Longevity 50%
Five levels are appropriate for this kind of game.

This issue's cover is in black and white, but the full colour image was too good to pass up. So we thought we'd attach it as a poster. Artwork by **Giuseppe Mangini** inspired by the game **Galaga**. Enjoy it!

Time, space and place... My fatal combo!

Referring to David's opening editorial, the lack of time is a common problem for all retro enthusiasts, but are we sure that it is the only problem that prevents us from fully enjoying our passion?

Personally, I agree with his final comment, we will always lack the time to give full satisfaction to our impulses. Marco Pistorio also talked about it in an editorial a few issues ago, even if we would dedicate an average of 5 minutes to try each of the games developed for one of these machines that we love so much, it would not take a lifetime to see them all. Not to mention that they are still developing new ones. And I'm only mentioning games, otherwise 5 minutes would be a waste...

But thinking about it, it's not only the lack of time that afflicts the poor retro-enthusiast. Let's say that someone is only interested in collecting, without necessarily having to use. Here comes into play the second variable: space. I challenge anyone to have the necessary space to keep in a proper way all the jewels that he owns or would like to own. It would take a huge place, a real museum, so many are the variety and combinations that have characterized the home computing from the 70s to 90s. Nowadays all this heterogeneity has been lost. Is it a good or a bad thing? Probably this reflection would deserve space too... Good material for a next editorial.

But to my fatal combo, to remain linked to a term dear to us, a third variable is added: the place. The place understood as the room dedicated to my passion. Let's assume that I manage to carve out some time for my experiments; will is power and an hour or two a day can be found. Let's assume that I have the space where to place these objects that are dear to me; after all, using emulators, fpga, raspberry... I don't need all this space, my studio is enough.... So what? What are you complaining about? I complain about the fact that I can't leave my wife alone with my daughter, just because I want to be with them, especially with my daughter who is a toddler now and needs to be able to play with both parents. And so I realize that I have to sacrifice some of my items and use what jsut fit in the living room: that is a laptop with emulators...

Probably this is just a temporary situation, the toddler will grow up and, I hope, she will want to play with me or will be at least curious to understand these strange objects so dear to his father. But for the moment this is the situation.

Time, space and place... My fatal combo! What's yours?

Francesco Fiorentini

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